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ABSTRACT

Presented is a concise, current overview of two of the United States' science and technology resources: financial support and scientific and technological personnel. Following this overview is a detailed analysis of research and development (R&D) resources viewed from a national perspective, including estimates for 1980. An appendix consists of a complete set of time-series tables. (CS)

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foreword

Each year the National Science Foundation (NSF) issues science resources reports that provide detailed information on various facets of the American scientific and technical personnel system and on the different modes of research and development (R&D) funding and performance. The Division of Science Resources Studies (SRS), which is responsible for the generation of these reports, continuously seeks suggestions for improvement of their publications from the user community. This community has articulated a need for a periodically updated document that provides a concise, current overview of U.S. science and technology resources to serve as a guide to the latest available information. This report was designed to meet such need.

The document, the initial volume of a new NSF series, presents first an integrated summary overview of U.S. science and technology resources based on the most current information available to the Foundation. This is followed by a more detailed analysis of R&D resources as viewed from a national perspective, including estimates for 1980. This part of the report should be especially valuable to policymakers who want to keep informed of the most salient trends in the resource system. An appendix, consisting of a complete set of time-series tables, completes the report. This appendix should be of special utility to analysts since it provides in one place a comprehensive set of science and technology resource data. The basic data set presented in this first volume will be maintained and updated in successive editions with information of special current or topical interest to be added periodically. References to the other more detailed NSF reports, which serve as the sources for this publication, are provided on the inside front and back covers. The full report is a useful complement to the National Science Board's periodic *Science Indicators* series, also prepared by the Division of Science Resources Studies, since these two documents will be published in alternate years.

Like any new endeavor, the first volume leaves room for modification and improvement; consequently, constructive critiques and suggestions are invited. Just as this new series is a response to a specific need voiced by users, it is hoped that future volumes will also reflect the requirements of policymakers, analysts, and other students of American science and technology.

Charles E. Falk
Director, Division of Science
Resources Studies
Directorate for Scientific,
Technological, and
International Affairs

March 1980

acknowledgments

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contents

Page

Summary 1

R&D Resources 2
National Totals 2
Basic Research, Applied Research, and Development 4
Federal R&D Support 4
Industrial R&D 6
Academic R&D 6

Science and Engineering Personnel 8
Employment Opportunities 8
S/E Labor Market Balance 10
Labor Market: Dynamics and Future Conditions 10

National Perspective of R&D Resources 12
The R&D Effort and the National Economy 12
R&D by National Objective 16
R&D and Other Economic Variables 16
Research Versus Development 17
Basic Research 17
Applied Research 18
Development 19
International Comparisons 20

Appendix

Statistical Tables 23

summary

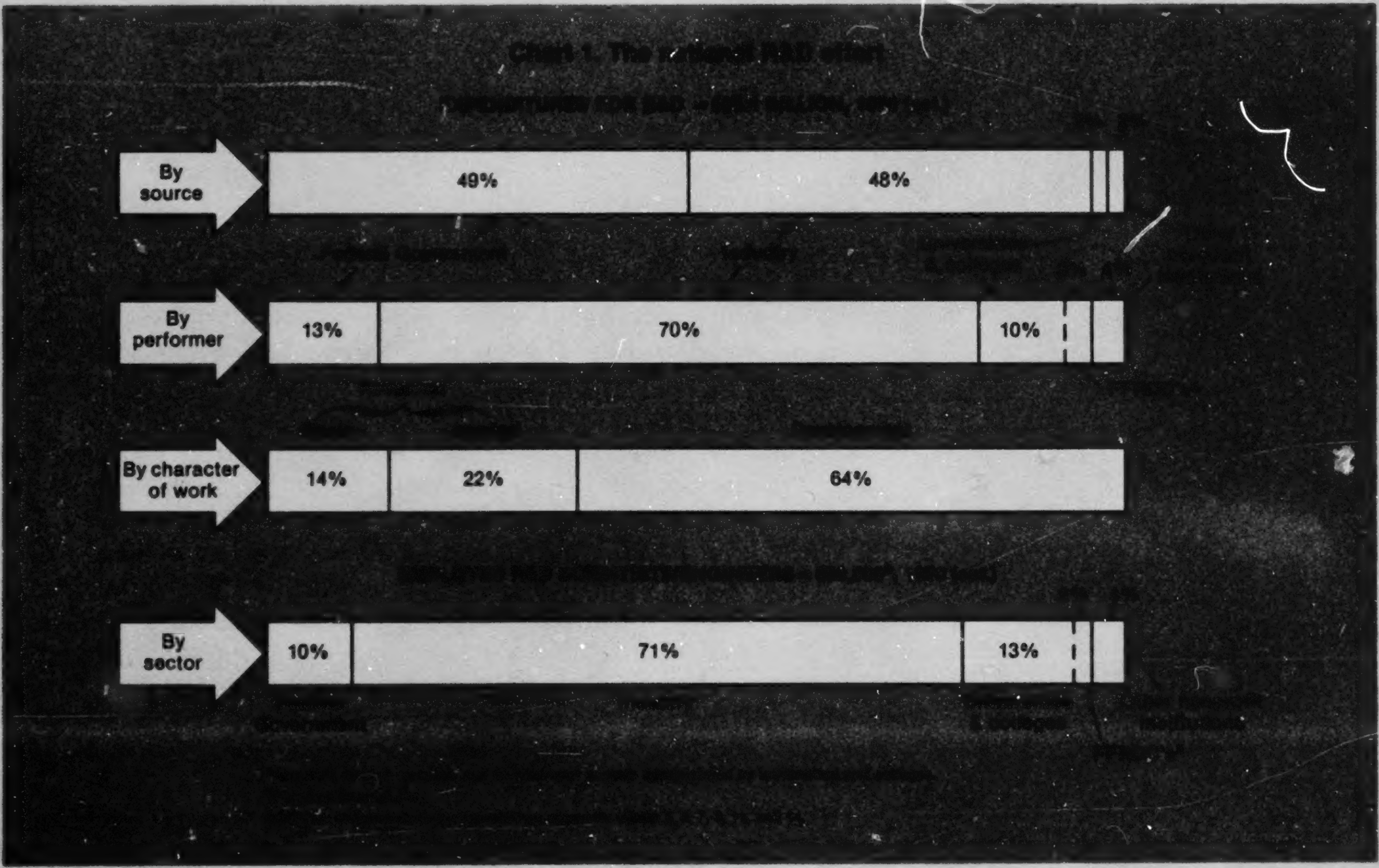
Numerous types of resources are required for effective R&D programs, ranging from creative individuals to the institutions that provide them a means to exercise their skills. This analysis covers only two of these resources—financial support and scientific and technical personnel. Although data on both can be used as indicators of R&D activity, and although each complements the other in showing the extent and distribution of our national R&D effort, both have some inherent weaknesses when used in this fashion. R&D dollars provide a measure of financial support and, when deflated, of activity. However, the lack of an appropriate R&D deflator and the variations in unit costs for different types of R&D activity blur the picture. Likewise, personnel data provide an accurate count of individuals involved in research and development and their characteristics, but they do not sort out differences in effectiveness or creativity. Notwithstanding these shortcomings, however, these resources provide pieces of a mosaic which, when put together, present a fairly reasonable picture.

The 1980 data presented in this report reflect the recent reductions in R&D programs contained in the Federal 1980 budget.

r&d resources

national totals

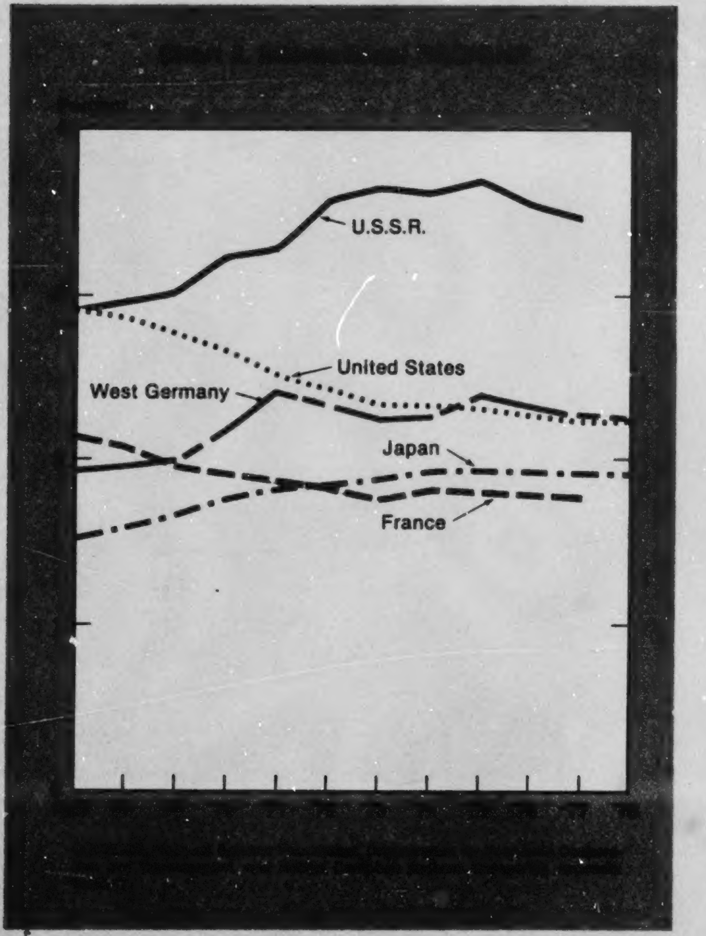
For the past four years, U.S. financial support for research and development has shown signs of renewed strength, nearly comparable to the levels recorded during the first seven years of the sixties. In constant dollars, the Nation's R&D expenditures have increased each year since 1975, for a 4-year total real growth of 18 percent. Non-Federal funding increased at almost twice the rate of Federal R&D funding. Defense, energy, and space-related research and development, representing two-fifths of the $54.3 billion R&D total in 1979, have been chiefly responsible for the recent growth in U.S. R&D activity, while inflation has been the chief damping factor in the growth of real R&D support. For 1980 the overall increase is estimated at 11 percent, or 1 percent in constant dollars using the Office of Management and Budget's (OMB) inflation estimate of 10 percent (chart 1).

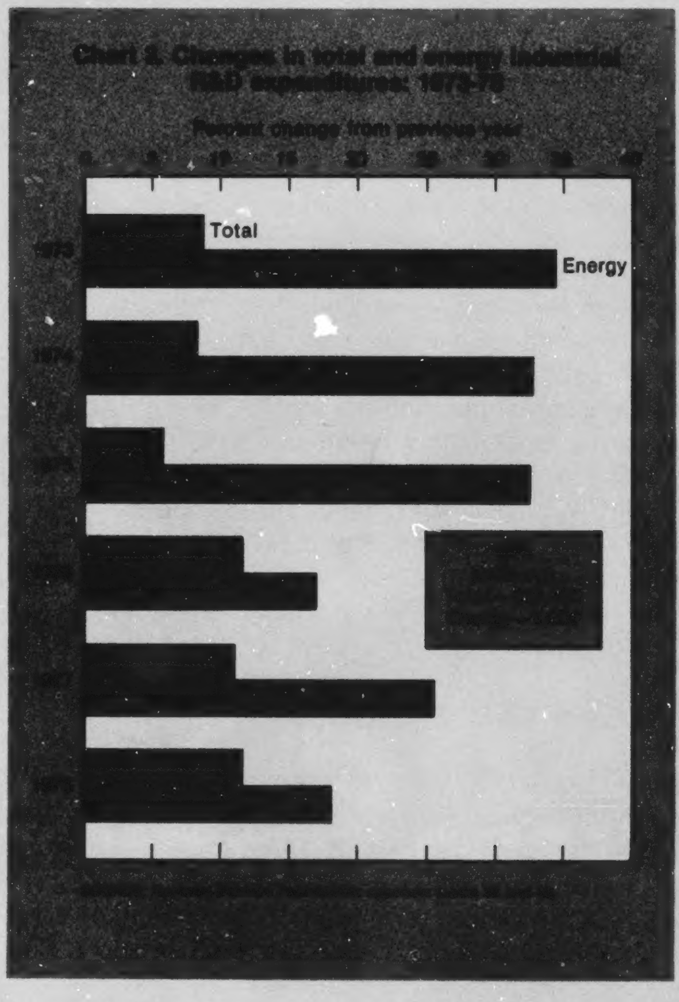


If the domestic scene is compared to the international one, it is evident that the United States spends more than any other nation on R&D activities—twice the total amount spent by the other major Western countries and Japan together. Relative to the gross national product (GNP), U.S. expenditures for R&D activities are equal to those of West Germany, with Japan a close third. If one excludes defense and space expenditures from the total and concentrates on "civilian" R&D activities, the resulting civilian R&D/GNP ratio is 1.5 percent for the United States as compared with 2.2 percent for West Germany and 1.9 percent for Japan. These ratios for all countries have been leveling off since the early seventies (chart 2).

The search for solutions to the energy shortage has clearly affected the national R&D picture. Since 1975 the increase in both Federal and industry R&D expenditures for energy programs has accounted for three-tenths of the constant-dollar increase in all R&D expenditures in the United States. Industry's energy-related R&D spending has risen at an average annual rate of 26 percent, or 18 percent in constant dollars since 1972 (chart 3). This growth occurred primarily in R&D funds provided by the Department of Energy, and from petroleum and electrical equipment companies' own funds. Federal energy-related R&D spending in constant dollars has risen at an annual rate of 19 percent since 1972. Industry's prime R&D emphasis has been on fossil fuels, particularly oil and coal, whereas Federal emphasis has been on nuclear energy development, although solar energy and conservation have each received substantial percentage increases.

Defense R&D expenditures, while clearly the largest single item in the Nation's R&D total (24 percent of the total in 1979), accounted for less than one-tenth of the real R&D dollar increase over the same period. The Federal 1980 budget, however, is reversing this situation with significant increases in defense R&D funding.





basic research, applied research, and development

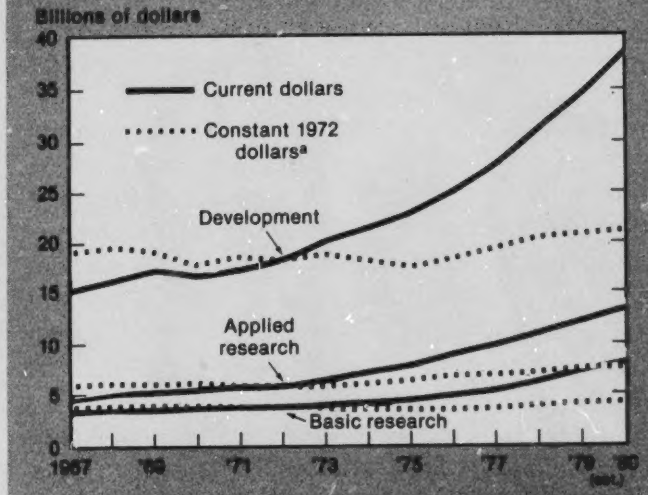
Nationally, within the research total, proportionately more funds have been allocated to basic research—35 percent in 1975 and an estimated 40 percent in 1980. This trend has resulted in part from the interest of two administrations in strengthening the Federal basic research effort. Between 1975 and 1979, Federal basic research obligations grew 24 percent in constant dollars. Because of fiscal restraints and inflation, real growth in Federal basic research support in 1980 is expected to be more moderate. Meanwhile, Federal expenditures for applied research and development increased in real terms between 1975 and 1979 at average annual rates of 2 percent each, compared with 4 percent each for the national total funding of these activities (chart 4).

federal r&d support

Federal R&D expenditures, which dropped in constant dollars by more than 20 percent between 1966—the peak year—and 1975, have increased each year since 1975 at an average annual rate of nearly 3 percent in real terms. Moreover, the proportion to total Federal outlays allocated to R&D support has increased in 1979 for the first time in a decade. Although significant increases have occurred in defense, space, and energy, the greatest Federal R&D emphasis during the late seventies was in the energy area (chart 5). For 1980 the Federal R&D effort is expected to stress defense activities, the space shuttle, and selected energy projects.

The administration's original 1980 budget set Federal R&D obligations for both intramural and extramural performance at $30.7 billion. Subsequent actions taken by the Congress, as well as carryovers of unobligated funds which were permitted in certain cases, increased this total to $32 billion. Finally, some proposed rescissions and deferrals to the 1980 R&D level have since been presented to the Congress but have not yet been acted upon. The effect on the 1980 R&D total is expected to be less than 1 percent. This final figure for Federal R&D obligations represents an average annual increase of about 8 percent from 1971 through 1980. An adjustment for inflation, however, shows real growth (averaging 4 percent per year), only

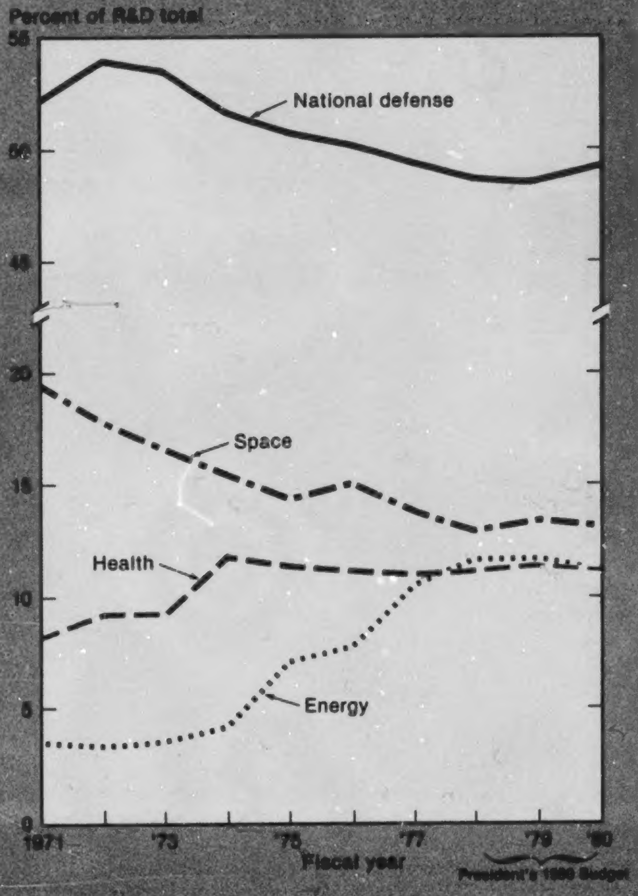
Chart 4. National R&D spending by character of work



[a]Based on the GNP implicit price deflator.

SOURCE: National Science Foundation; appendix tables 7, 9, and 11

Chart 5. Distribution of Federal R&D support by selected budget function

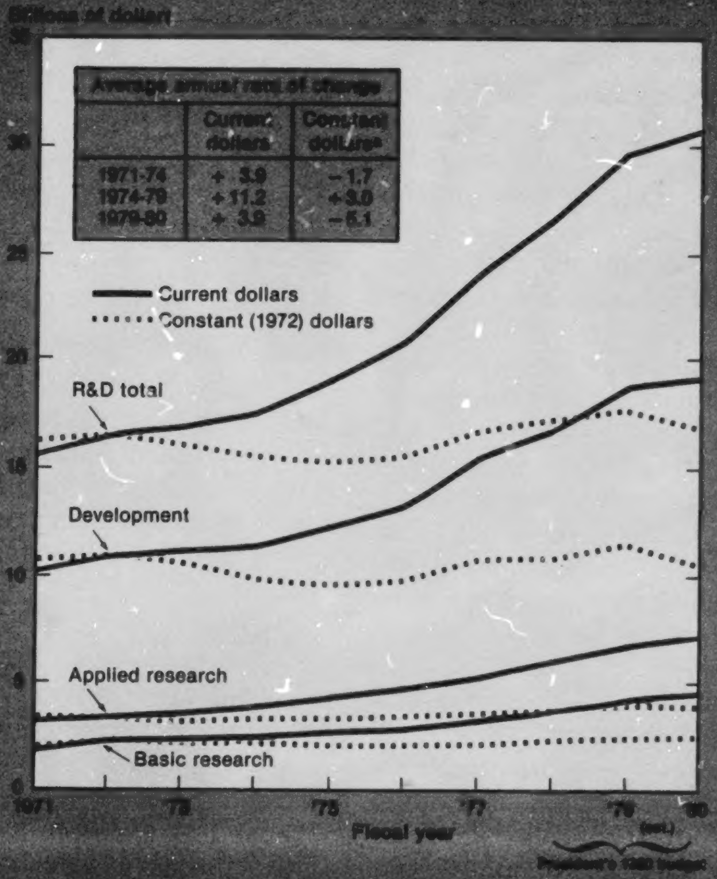


SOURCE: National Science Foundation, appendix table 21a between 1975 and 1979, primarily based on increased funding for defense, space, and energy programs. No real growth in Federal R&D obligations is expected for 1980 using the 10-percent increase in the implicit price deflator for the GNP estimated by OMB.

The focus of Federal R&D obligations changed significantly between 1971 and 1979, with an increase in research activity relative to development (chart 6). Over this period, Federal support for basic research grew 2.8 percent in constant dollars; all the growth occurred after 1976 because of a deliberate administration policy to increase basic research in real terms. Between 1971 and 1979, growth for applied research obligations in constant dollars averaged 2.0 percent annually—notably in health, defense, space, and energy. By 1979, research made up 37 percent of total Federal R&D obligations against 34 percent in 1971, with corresponding decreases in the proportions represented by development.

Within the research total, however, not all fields of science increased at the same rates between 1971 and 1979. Since 1971 the fields growing most rapidly have been (1) the life sciences, (2) the environmental sciences, and (3) mathematics and computer science—in that order. The life sciences accounted for 36 percent of all Federal research obligations in 1979, engineering for 24 percent, the physical sciences for 17 percent, and the environmental sciences for 11 percent.

Chart 6. Federal R&D obligations by character of work



Average annual rate of change		
	Current dollars	Constant dollars[a]
1971-74	+ 3.9	− 1.7
1974-79	+ 11.2	+ 3.0
1979-80	+ 3.9	− 5.1

[a] Based on GNP implicit price deflator with an estimate of 9.6 percent for 1980.

SOURCE: National Science Foundation; appendix table 22.

industrial r&d

Since 1975, industrial R&D spending has been increasing at a faster constant-dollar rate—6 percent annually through 1979—than has Federal R&D support (3 percent). Within the industry sector, which provides about 95 percent of the non-Federal total, the growth in company R&D spending has closely paralleled sales increases. Based on interviews with industrial R&D officials, this growth reflects in part a change in corporate strategy, which places greater emphasis on R&D performance as a source of future growth and new market opportunities. Corporate strategy, however, is only a partial explanation for recent increases in company R&D funding. The Federal Government provides almost 50 cents of every R&D dollar spent domestically and industry provides 47 cents; however, Federal policies influence industry's own expenditures through the establishment of regulations and minimum standards in areas such as environmental pollution, food and drug production, and public safety.

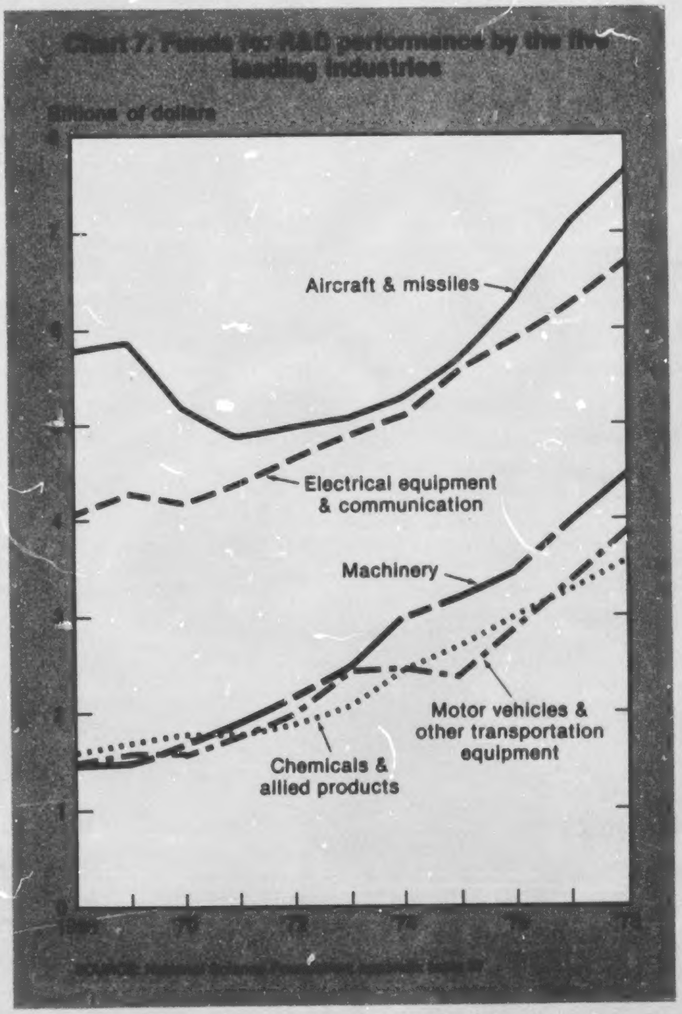
Performance of research and development by industrial firms reached $33.4 billion in 1978, a 4-percent constant-dollar gain over the 1977 figure. Nearly 80 percent of these R&D funds are spent by companies in five industries—aircraft, electrical equipment, machinery, motor vehicles, and chemicals. Aircraft and electrical equipment companies alone account for about 45 percent of the total (chart 7). NSF projects that industry's total R&D expenditures will exceed $42 billion in 1980.

Industrial research and development directed toward pollution abatement rose 10 percent in real terms between 1977 and 1978. This increase is attributed primarily to efforts of the motor vehicles industry to meet requirements for fuel economy and exhaust emissions and the effect of the Toxic Substances Control Act of 1977 on chemicals producers. Since 1975, R&D funds for pollution abatement have risen 11 percent per year in constant-dollar terms.

Greater emphasis on basic research has also occurred, particularly in energy-related work. After adjusting for inflation, industry reported a 20-percent increase in its company basic research funds between 1975 and 1979; industry had decreased its basic research funds by a similar amount during the previous nine years.

Further evidence of real growth in industrial research and development was in the 6-percent rise in the number of R&D scientists and engineers employed by industry in 1979; this amounted to an all-time high of 440,000. Since 1972, the first year in which company R&D funds began to increase in real terms, employment of R&D scientists and engineers has risen continuously. NSF projects employment of 465,000 in the industrial sector in 1980.

Chart 7. Funds for R&D performance by the five leading industries



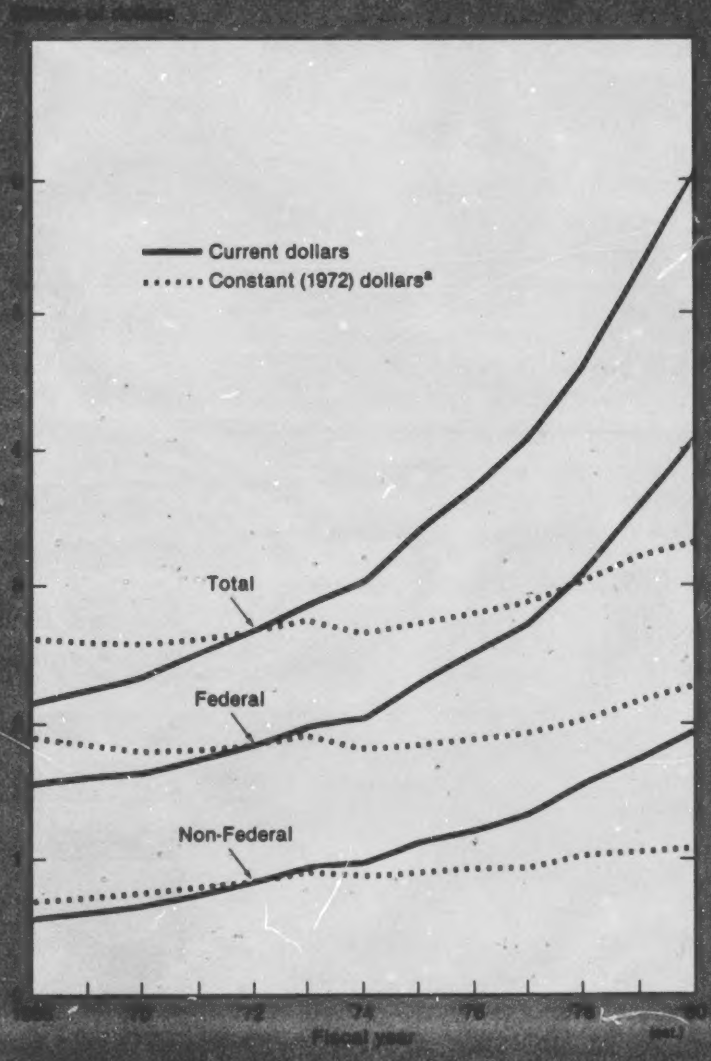
academic r&d

Academic R&D expenditures have increased at rates significantly above the rate of inflation in every year since 1975. By 1977 this support had passed the previous peak of 1973, and in 1978 it reached $4.6 billion. Both Federal and non-Federal sources of funding contributed to these increases, which in 1978 amounted to 14 percent over the 1977 figure (or 6 percent in constant dollars) (chart 8).

Since Federal Government agencies fund more than two-thirds of the R&D expenditures of institutions of higher education, budgetary decisions of these agencies may be analyzed to provide short-term projections. Data in the 1980 governmental budget documents indicate continuing increases in Federal R&D funding at universities and colleges in real terms through 1979 and a leveling off or decline in 1980.

Universities and colleges spend more than one-half of all basic research funds in the Nation, with most of the financing being provided by the Federal Government. Academic R&D funding from non-Federal sources has also shown considerable gains, increasing 18 percent in constant-dollar terms between 1975 and 1979. After declines averaging 1 percent annually in real terms between 1972 and 1976, total academic expenditures for basic research increased between 1976 and 1978 by 9 percent per year, with the 1977-78 real increase amounting to 6 percent. There has been a shift in emphasis away from basic research toward applied research, however. Basic research accounted for 69 percent of all academic R&D expenditures in 1978, compared with 77 percent a decade earlier, while the proportion allocated to applied research grew from 19 percent to 26 percent.

Chart 8. Academic R&D expenditures by source



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science and engineering personnel

employment opportunities

Employment of scientists and engineers in 1978 showed general improvement over 1976, but these improvements were not shared equally among all fields, among all race and sex groups, at all degree levels, or in all sectors of the economy. Science and engineering (S/E) employment increased by 4 percent between 1976 and 1978, in contrast with the 8-percent rate of the total work force (chart 9).

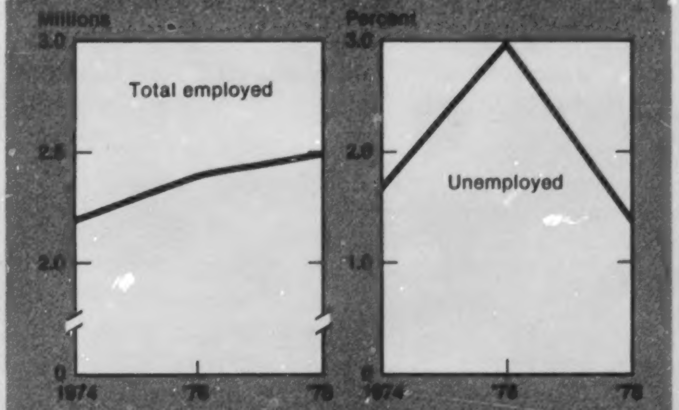
Employment in S/E jobs increased for engineers, but fell for scientists between 1976 and 1978. Except for computer specialists, who had a growth rate of over 30 percent, employment fell in all major fields of science. These data reflect relatively strong demand for engineers and computer specialists.

The 1978 employment experience of recent (1976) S/E baccalaureates supports the evidence of strong employment demand in these fields. Of those with degrees in engineering and computer science, four-fifths found employment in occupations matching their degree field. In contrast, less than 15 percent of the mathematics and social science degree-holders found such jobs (chart 10).

Although the data on employment in S/E jobs suggest that job opportunities for scientists in some fields of specialization have been limited in recent years, scientists had no real difficulty in finding work. Total employment for scientists (in any type of job) increased more rapidly than total employment for engineers—6.0 percent vs. 2.2 percent. However, all of the employment growth for scientists occurred in non-S/E jobs, while for engineers, the growth was in S/E positions.

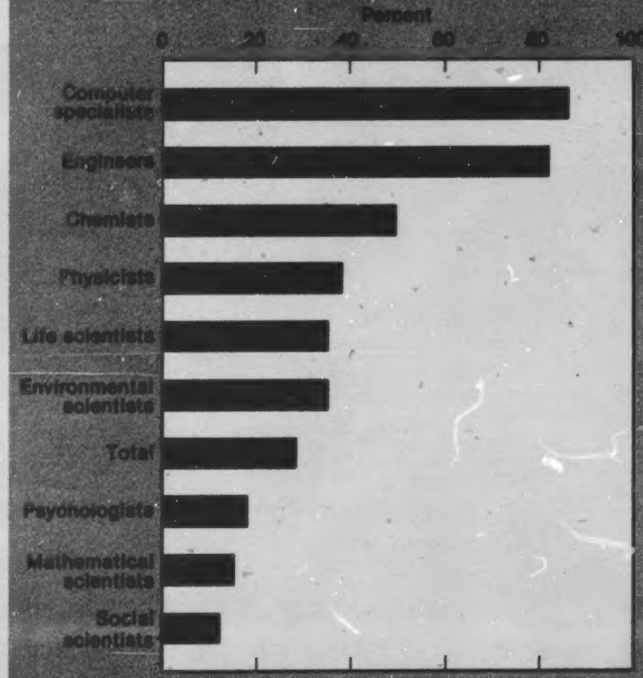
Women and black scientists and engineers experienced greater than average improvements in total employment opportunities—i.e., in either S/E or non-S/E jobs. Employment of women increased

Chart 9. Employment status of scientists and engineers



SOURCE: National Science Foundation, appendix table 67

Chart 10. Proportion of 1976 science/engineering baccalaureates employed in occupation coincident with their field of degree: 1978



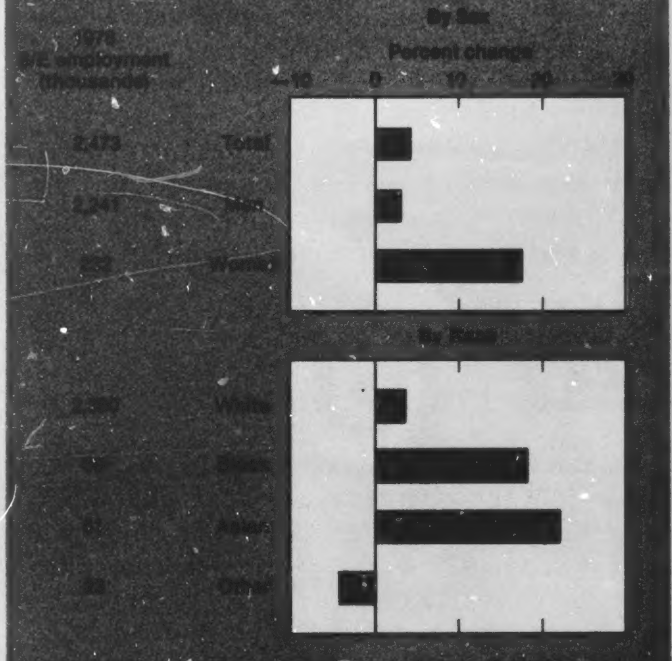
SOURCE: National Science Foundation, based on appendix table 80.

by 17 percent compared to 3 percent for men (chart 11). Although S/E women have been increasingly successful in entering the work force, they still represented only 9.5 percent of S/E employment. Employment of black scientists and engineers grew by 10 percent between 1976 and 1978, compared to an overall 4-percent S/E growth rate. Thus, the black share of the work force increased slightly to 2 percent.

The S/E doctorates group was another major beneficiary of the improved employment opportunities. Here, employment grew by 10 percent in the late seventies, faster than the overall rate of 4 percent. This indicates that the quality of the S/E work force, measured by level of degree attainment, is being enriched. The reasons for this degree upgrading could be a screening of jobs among an excess supply of applicants and/or a true increase in the skill requirements of jobs in these areas. This recent S/E doctorate rate of growth, less rapid than the 16 percent experienced in the midseventies, resulted primarily from the slower growth in the academic sector, a major employer of S/E doctorates. The recent tapering off of enrollment increases caused this slowdown. Demographic projections indicate that this enrollment trend is likely to continue through the mideighties and may actually become a decline. The projected stagnation in academic employment, combined with the current age composition of employed tenured faculty, points toward poorer future employment opportunities in this sector for graduating Ph.D. scientists and engineers.

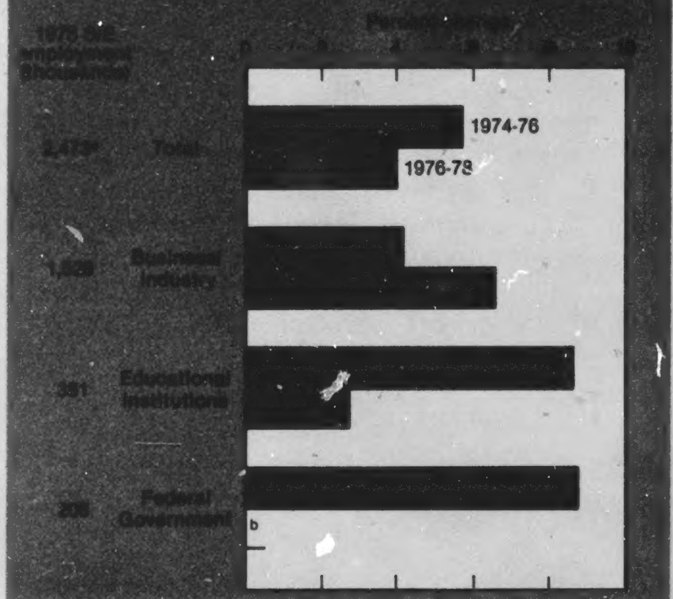
The 1976-78 S/E employment growth took place largely in the industry sector of the economy, where employment grew by almost 7 percent (chart 12). In contrast, a less than 3-percent growth rate was experienced by those employed in educational institutions and a levelling-off, or decline, was experienced by those in the Federal Government or other sectors of the economy. The rapid growth in the industry sector resulted from the post-1976 recovery of economic activity and recent increases in real levels of industrial R&D expenditures. The slower employment growth in educational institutions was primarily the result of demographic factors forcing academic employers to reduce their rates of hiring. This slowdown has been concentrated among institutions not granting S/E degrees, primarily 2-year colleges. Statistics on part-time

Chart 11. Changes in employment of scientists and engineers: 1976-78



SOURCE: National Science Foundation, [illegible]

Chart 12. Scie[illegible] engineering employment growth [illegible] sector: 197[illegible]



aIncludes "all others" [illegible]

bLess than 0.5 percent

SOURCE: National Science Foundation, based on [illegible]

S/E employment and utilization of scientists and engineers on nontenure track jobs offer further evidence of the declining employment opportunities in academia. Both types of employment have been growing as a proportion of total academic employment, indicating the lack of tenure-track job openings.

S/E employment growth for those primarily employed in research and development during the 1976-78 period was more rapid than comparable increases in non-R&D activities—9 percent vs. 2 percent.

s/e labor market balance

A frequently used indicator of balance between employment opportunities and the available supply of scientists and engineers is the unemployment rate. Between 1976 and 1978 the S/E unemployment rate fell from 3.0 percent to 1.4 percent. This decline was proportionately larger than the comparable decline for the total civilian labor force where unemployment dropped from 7.7 percent to 6.0 percent.

Unemployment rates, however, cannot be used as the only indicator of supply/demand balance, especially for occupations such as science and engineering. Even though the high level of educational attainment generally associated with S/E occupations assures low unemployment rates, still a significant number of working scientists and engineers could be involuntarily employed in non-S/E jobs. Such involuntary employment, however, is not borne out by the evidence. For example, although 15 percent of employed scientists and engineers were working in non-S/E jobs in 1978, almost all selected this type of employment voluntarily because of better career opportunities, improved pay, or more interesting work.

labor market: dynamics and future conditions

The future S/E labor market balance depends critically on a number of factors: The number of new entrants to the S/E labor force; the nature and extent of mobility between S/E and non-S/E jobs; attrition from the S/E labor force; and, future trends in employment opportunities for scientists and engineers.

With respect to new S/E entrants, the number of bachelor's degrees has been levelling off since 1974; master's degrees have remained stable since 1972; and doctorates have slowly decreased since 1973 (chart 13). Demographic and economic factors indicate that these trends are likely to continue in the near future.

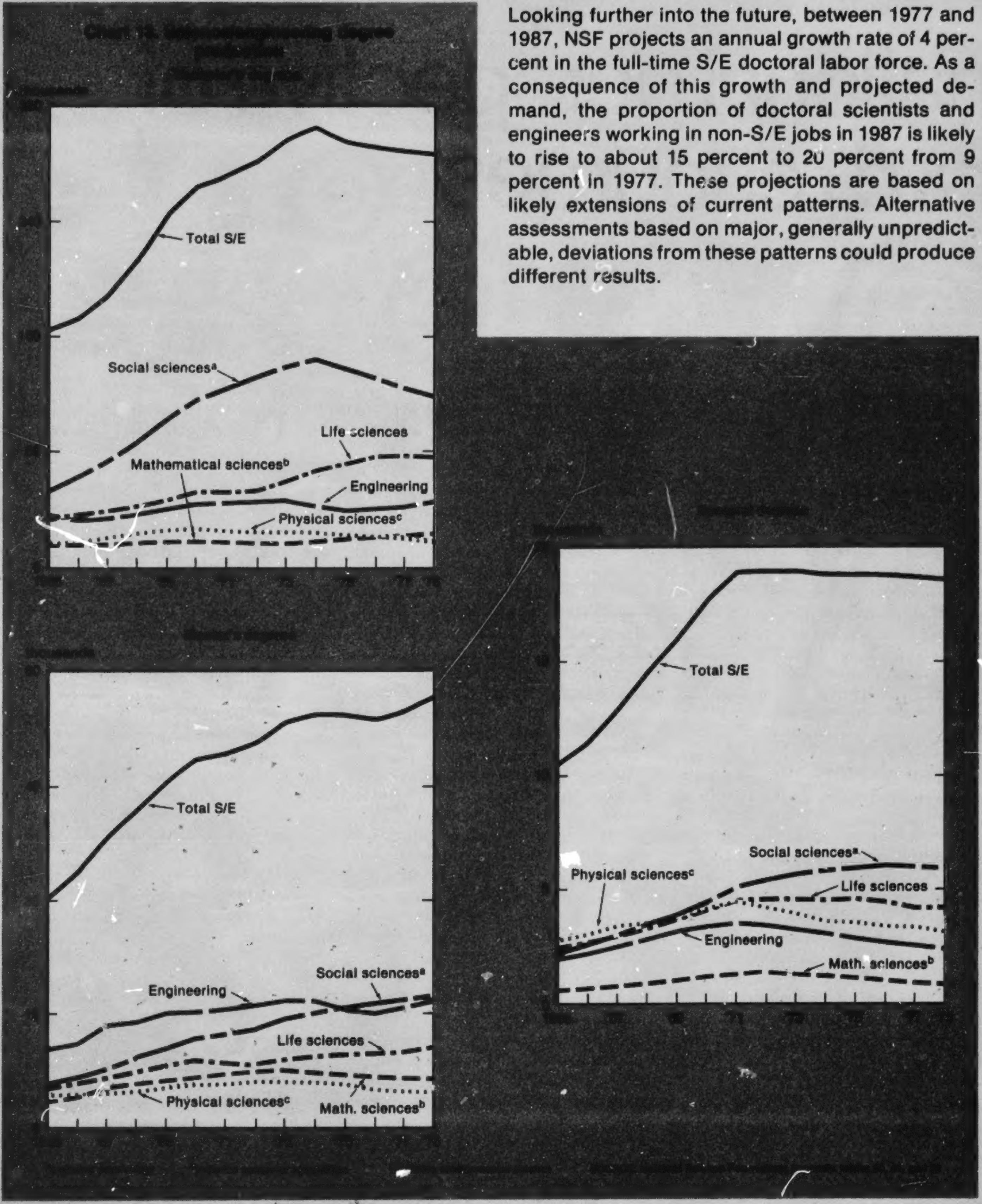
Mobility between S/E and non-S/E jobs can also alleviate S/E labor market imbalances. Of the almost 175,000 persons in technical and related occupations (but not science and engineering) in 1972, more than 62,000 (36 percent) had entered S/E jobs by 1976, the latest year for which data are available. About 25 percent of those were engineers. This return flow has been in response to the relatively strong employment opportunities for engineers. This mobility indicates that to some degree sudden surges in the S/E employment demand can be met from the available pool of scientists and engineers who are not employed in S/E jobs, if the incentives are sufficiently attractive. Offsetting this inflow, approximately 175,000 scientists and engineers working in S/E jobs moved either to managerial or other non-S/E jobs between 1972 and 1978. This type of mobility can alleviate some of the adverse consequences of unexpected declines in employment demand.

Attrition from the S/E labor force through death, retirement, or other reasons, provides job openings even when S/E employment does not grow. The annual attrition rate of less than 2 percent creates job openings for approximately 37,000 S/E professionals.

Uncertainty about future economic conditions makes attempts to estimate the S/E labor market balance for 1980 hazardous. Despite the declining rates of production of S/E degrees in recent years, however, the supply of scientists and engineers is expected to continue to outgrow the supply of S/E jobs, thus producing further increases in non-S/E employment. If recent trends continue, these increases in S/E supply will probably be concentrated in the sciences (except computer sciences) and not in engineering.

In addition to replacement needs, about 25,000 new jobs per year will be required to keep S/E unemployment and non-S/E employment from rising.

Looking further into the future, between 1977 and 1987, NSF projects an annual growth rate of 4 percent in the full-time S/E doctoral labor force. As a consequence of this growth and projected demand, the proportion of doctoral scientists and engineers working in non-S/E jobs in 1987 is likely to rise to about 15 percent to 20 percent from 9 percent in 1977. These projections are based on likely extensions of current patterns. Alternative assessments based on major, generally unpredictable, deviations from these patterns could produce different results.



18

national perspective of r&d resources

the r&d effort and the national economy

Total U.S. R&D spending in 1979 reached $54.3 billion, a 12-percent increase over the $48.3 billion in 1978 and more than double the amount in 1969. In constant dollars, the 1978-79 increase was 3 percent[1] (chart 14). The real-term growth in the national R&D effort each year since 1975 has resulted largely from Federal energy R&D increases and general industry increases. Even after the reductions in R&D programs contained in the 1980 Federal budget, continued real growth is likely during 1980, but at a reduced rate.

In 1980 R&D expenditures are expected to increase by 11 percent over 1979 levels to $60 billion, with the largest absolute increase anticipated in the industrial sector. This rise can be partially attributed to growth in funds used for energy R&D projects and also, according to industry representatives, for projects to meet government regulatory requirements. The largest relative increase in 1980—13 percent—is expected in the university and college sector; this change reflects growing emphasis on basic research. Industrial research and development is expected to rise by 12 percent between the two years.

Along with real increases in R&D expenditures through 1979, the full-time-equivalent (FTE) employment of R&D scientists and engineers recorded growth. The FTE employment of R&D scientists and engineers has been increasing steadily since 1972, when 518,000 were employed. This growth, which has occurred primarily in the industrial sector, reflects greater emphasis on energy-related R&D efforts. Assuming that the employment growth rate for R&D scientists and engineers continues to parallel closely the rate of real R&D expenditures, the FTE employment of these professionals in 1980 is estimated at 659,000—a 5-percent increase over the 1979 figure.

The Federal Government furnished $26.8 billion for R&D activities in 1979, 11 percent more than in 1978. In constant dollars, the increase exceeded 2 percent. Federal R&D funding in real terms has increased each year since 1975, averaging about 3 percent annually, largely in response to the growing national emphasis on energy development and conservation.

Since the midsixties non-Federal R&D support has continued to rise at a faster rate than Federal—3 percent annually from 1967 to 1979 versus minus 1 percent. This rise results chiefly from greater industry spending over this entire period as well as from defense and space cutbacks during the early seventies. Consequently, by 1979 Federal R&D support had fallen below 50 percent of the national R&D effort.

It is anticipated that Federal R&D support in 1980 will increase 10 percent to $29.4 billion,[2] while non-Federal support is likely to rise 12 percent to $31.0 billion. The Federal R&D effort for 1980 is expected to stress defense and space activities and to support energy projects selectively, to avoid Federal preemption of the private sector.[3]

Industry, which provides more than 90 percent of non-Federal R&D funds, is expected to perform 70 percent of all U.S. research and development in 1979 and 1980 (see table). For the past two decades, the relationship between company-funded research and development and sales has remained relatively constant at 2 percent. In 1980 this relationship should continue, and the increase in real company R&D funds should keep pace with the projected 3-percent real growth in sales.[4] This increase will be stimulated by energy and environmental concerns.

In the late sixties, the Government provided nearly one-half of industry's R&D funds. Since the midseventies, however, industry's own funds have provided for approximately two-thirds of its R&D effort, with the Government providing the remainder. This drop re-

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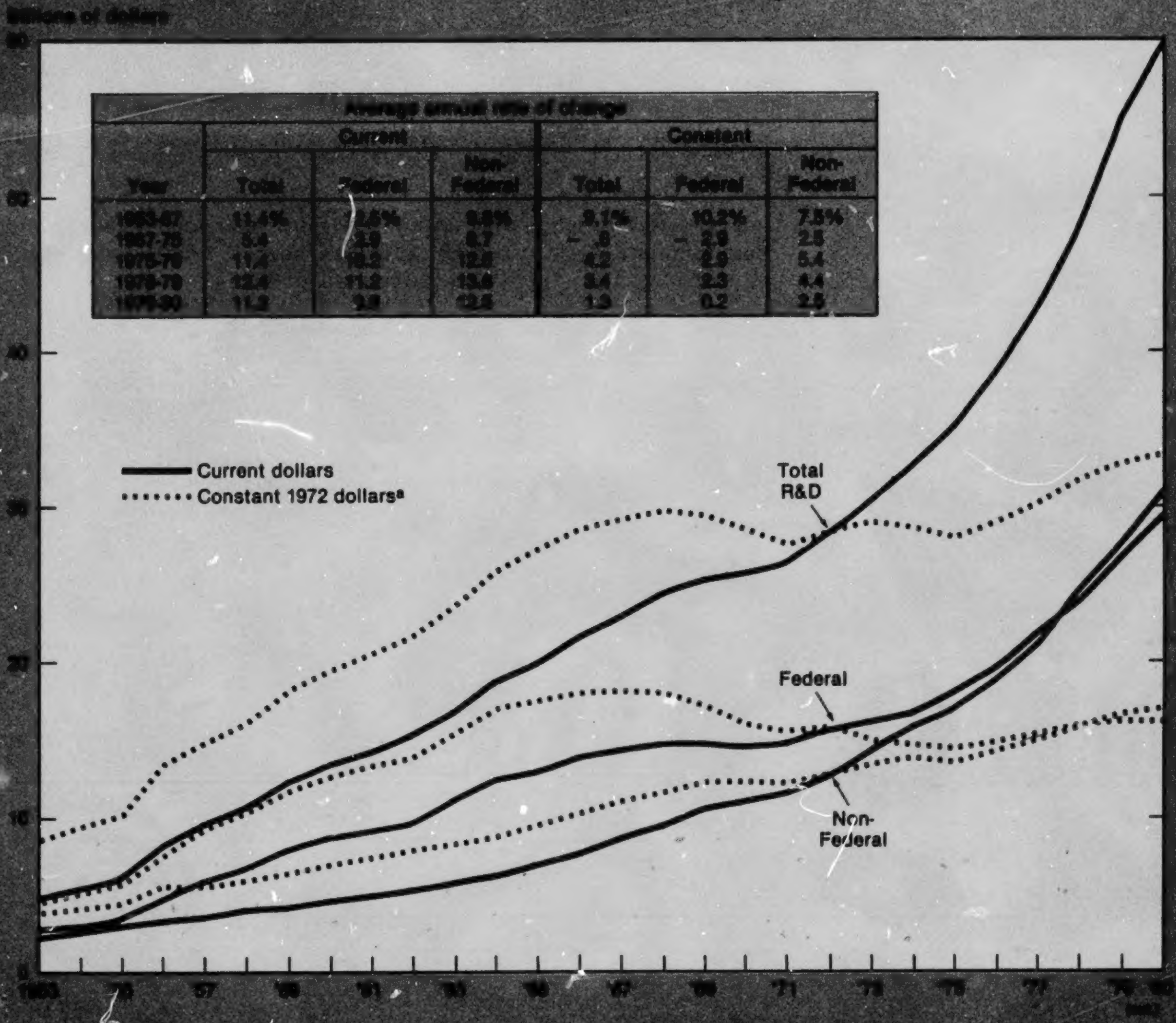
[1] In the absence of a reliable R&D cost index, the implicit price deflator for the GNP has been used to convert R&D expenditures to constant dollars. The GNP deflator includes the effects of price changes for all goods and services in the economy and, therefore, can only indicate approximate changes in costs of inputs specifically related to R&D performance. The increase in the GNP deflator between 1978 and 1979 was 9 percent.

[2] National Science Foundation, "Real Growth Unlikely in 1980 Federal R&D Funding," *Science Resources Studies Highlights* (NSF 79-319) (Washington, D.C., Nov. 16, 1979).

[3] Office of Management and Budget, "Special Analysis K," *The Budget of the United States Government, Fiscal Year 1981* (Washington, D.C.: U.S. Government Printing Office, 1980), p. 303.

[4] Department of Commerce, *1979 U.S. Industrial Outlook* (Washington, D.C.: U.S. Government Printing Office, January 1979.

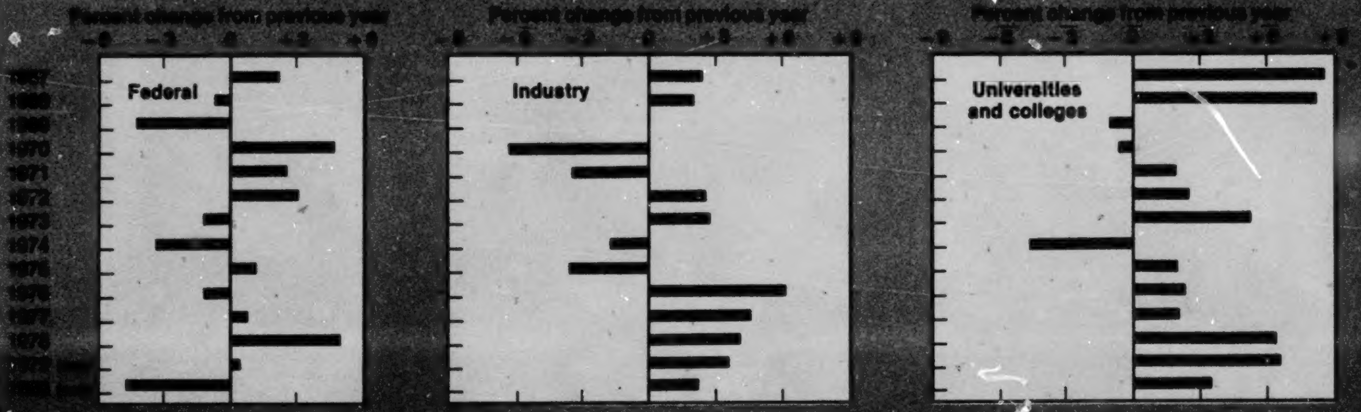
Chart 14. National R&D funding



Average annual rate of change						
	Current			Constant		
Year	Total	Federal	Non-Federal	Total	Federal	Non-Federal
1953-67	11.4%	12.5%	9.8%	9.1%	10.2%	7.5%
1967-75	5.4	2.9	8.7	− .8	− 2.9	2.5
1975-78	11.4	10.2	12.5	4.2	2.9	5.4
1978-79	12.4	11.2	13.6	3.4	2.3	4.4
1979-80	11.2	9.8	12.5	1.3	0.2	2.5

^a Based on GNP implicit price deflators.
SOURCE: National Science Foundation; appendix table 2.

Chart 15. National R&D spending by performer (Based on 1972 dollars)



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Intersectoral transfers of funds used for performance of research and development, basic research, applied research, and development: 1980 (estimated)

RESEARCH AND DEVELOPMENT[1]

[Dollars in millions]

Sources of funds	Performers						
	Federal Govern-ment	Industry[2]	Univer-sities and colleges[3]	Associated FFRDC's[4]	Other nonprofit institu-tions[2]	Total	Percent distribution, sources
Federal Government	$7,830	$13,950	$4,100	$2,000	$1,520	$29,400	48.7
Industry	——	[5]28,300	210	——	200	28,710	47.6
Universities and colleges	——	——	[5]1,300	——	——	1,300	2.2
Other nonprofit institutions	——	——	440	——	[5]525	965	1.6
Total	7,830	42,250	6,050	2,000	2,245	60,375	
			8.050				
Percent distribution, performers	13.0	70.0	10.0	3.3	3.7		100.0
			13.3				

BASIC RESEARCH[1]

[Dollars in millions]

Sources of funds	Performers						
	Federal Govern-ment	Industry[2]	Univer-sities and colleges[3]	Associated FFRDC's[4]	Other nonprofit institu-tions[2]	Total	Percent distribution, sources
Federal Government	$1,210	$325	$3,100	$650	$450	$5,735	69.7
Industry	——	[5]1,000	125	——	95	1,220	14.8
Universities and colleges	——	——	[5]785	——	——	785	9.5
Other nonprofit institutions	——	——	265	——	[5]225	490	6.0
Total	1,210	1,325	4,275	650	770	8,230	
			4.925				
Percent distribution, performers	14.7	16.1	51.9	7.9	9.4		100.0
			59.8				

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[1] All data are estimated from reports by performers.

[2] Expenditures for federally funded research and development centers (FFRDC's) administered by both industry and by nonprofit institutions are included in the totals of their respective sectors. They are estimated to account for less than 5 percent and 15 percent, respectively, of the industry and nonprofit institutions performance totals. FFRDC's are organizations exclusively or substantially financed by the Federal Government to meet a particular requirement or to provide major facilities for research and training purposes.

Intersectoral transfers of funds used for performance of research and development, basic research, applied research, and development: 1980 (estimated)—Continued

APPLIED RESEARCH[1]

[Dollars in millions]

Sources of funds	Performers: Federal Govern-ment	Industry[2]	Univer-sities and colleges[3]	Associated FFRDC's[4]	Other nonprofit institu-tions[3]	Total	Percent distribution, sources
Federal Government	$2,520	$1,825	$825	$575	$550	$6,295	46.6
Industry	——	[5]6,300	75	——	65	6,440	47.7
Universities and colleges	——	——	[5]440	——	——	440	3.3
Other nonprofit institutions	——	——	140	——	[5]190	330	2.4
Total	2,520	8,125	1,480	575	805	13,505	
			2.055				
Percent distribution, performers	18.7	60.2	11.0	4.3	6.0		100.0
			15.2				

DEVELOPMENT[1]

[Dollars in millions]

Sources of funds	Performers: Federal Govern-ment	Industry[2]	Univer-sities and colleges[3]	Associated FFRDC's[4]	Other nonprofit institu-tions[3]	Total	Percent distribution, sources
Federal Government	$4,100	$11,800	$175	$775	$520	$17,370	45.0
Industry	——	[5]21,000	10	——	40	21,050	54.5
Universities and colleges	——	——	[5]75	——	——	75	.2
Other nonprofit institutions	——	——	35	——	[5]110	145	.4
Total	4,100	32,800	295	775	670	38,640	
			1.070				
Percent distribution, performers	10.6	84.9	.8	2.0	1.7		100.0
			2.8				

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[3] Includes agricultural experiment stations.

[4] Federally funded research and development centers (FFRDC's) administered by individual universities and colleges and by university consortia.

[5] Includes State and local government funds.

SOURCE: National Science Foundation.

sults mainly from cutbacks in the defense and space areas.

The Federal Government, which performs approximately 13 percent of total R&D activities, is the second-largest R&D performer in the Nation. It is expected that in 1980 $7.8 billion will be expended for R&D activities in Federal laboratories, 4 percent more than in 1979 (chart 15). Federal intramural R&D performance remained relatively constant in real terms between 1975 and 1979 as both the Department of Defense and the National Aeuronautics and Space Administration (NASA) contracted more of their R&D efforts to industrial firms.

r&d by national objective

Defense and space projects will likely claim approximately two-thirds of Federal R&D funds during 1979 and 1980, down from 85 percent in the early-to-midsixties, and 80 percent in the late sixties (chart 16). This change results from many factors, including the growth in R&D programs in health, environment, and energy; the rise and phase-out of the Apollo program; and a period of no-growth in overall defense R&D programs in the early seventies. The remaining one-third of the Federal R&D effort is devoted to civilian areas, with the largest dollar increases over 1978 expected in the energy and health fields. Since 1970, R&D expenditures for energy and health have increased from 2 percent and 7 percent of the Federal R&D total, respectively, to more than 10 percent each. The energy R&D increases covered fusion, fossil fuels, solar, geothermal, and conservation; in health, the major increases went to cancer and heart.

Industry R&D support sources in 1979 and 1980 are expected to show large increases over 1978 levels in activities related to energy and the environment. Since 1972, the first year for which energy data were available, industrial R&D spending for energy has increased annually by an average of nearly 20 percent in real terms through 1978. Since 1975, when environmental data were first collected, industrial spending for environmental research and development has increased by 15 percent annually.

r&d and other economic variables

Total R&D expenditures are expected to account for 2.3 percent of the Nation's GNP in 1980. This ratio peaked at about 3 percent in the midsixties, declined steadily to 2.3 percent in 1973, and remained there until now (chart 17). This GNP ratio drop was caused primarily by the slowdown in the growth of Federal R&D programs through the midseventies. Since about 1974, increases in both Federal and non-Federal R&D efforts concerning energy have been a major factor in the stabilization of this ratio. Based on projections into the eighties of both R&D funding[5] and the GNP,[6] this ratio should continue to remain near its present level at least through the mideighties.

A second measure of the relative emphasis on R&D activities in the economy is the ratio of the Nation's R&D professional work force to the employed civilian labor force. In 1979, of every 10,000 persons in the total employed civilian labor force, 65 were FTE R&D scientists and engineers. This ratio has remained relatively constant since the early seventies (chart 18). The expected rise in R&D funding in 1980, plus an augmented labor force, should result in a relatively level ratio at least through that year.

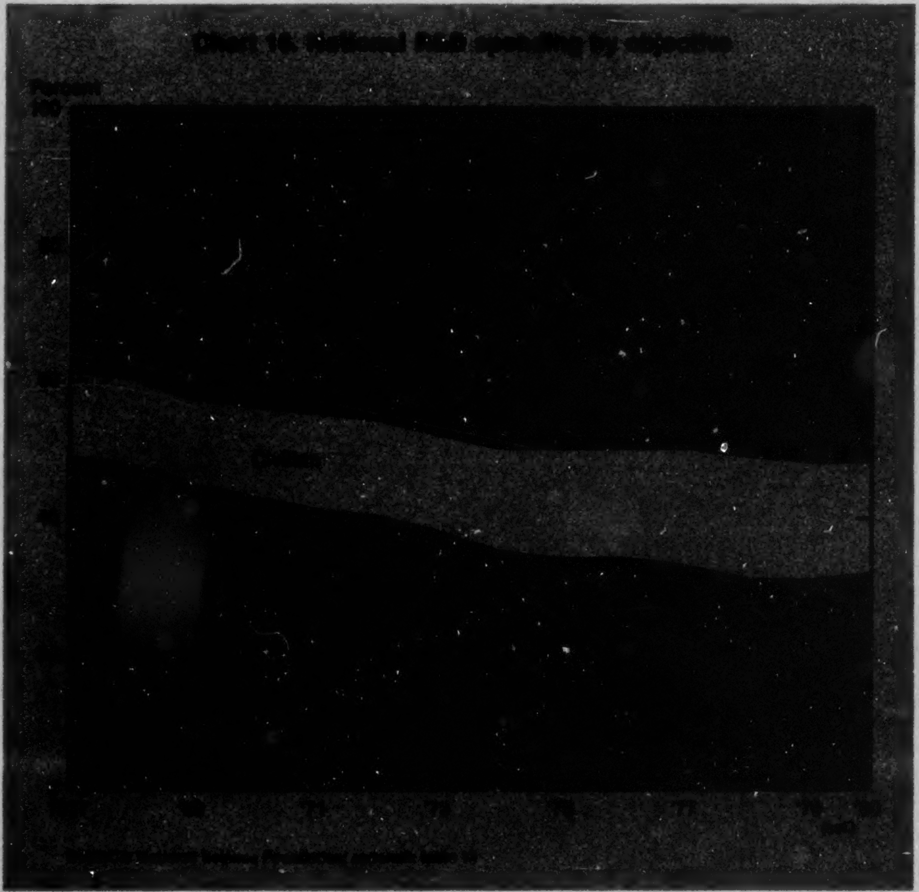

Chart 16. National R&D spending by objective

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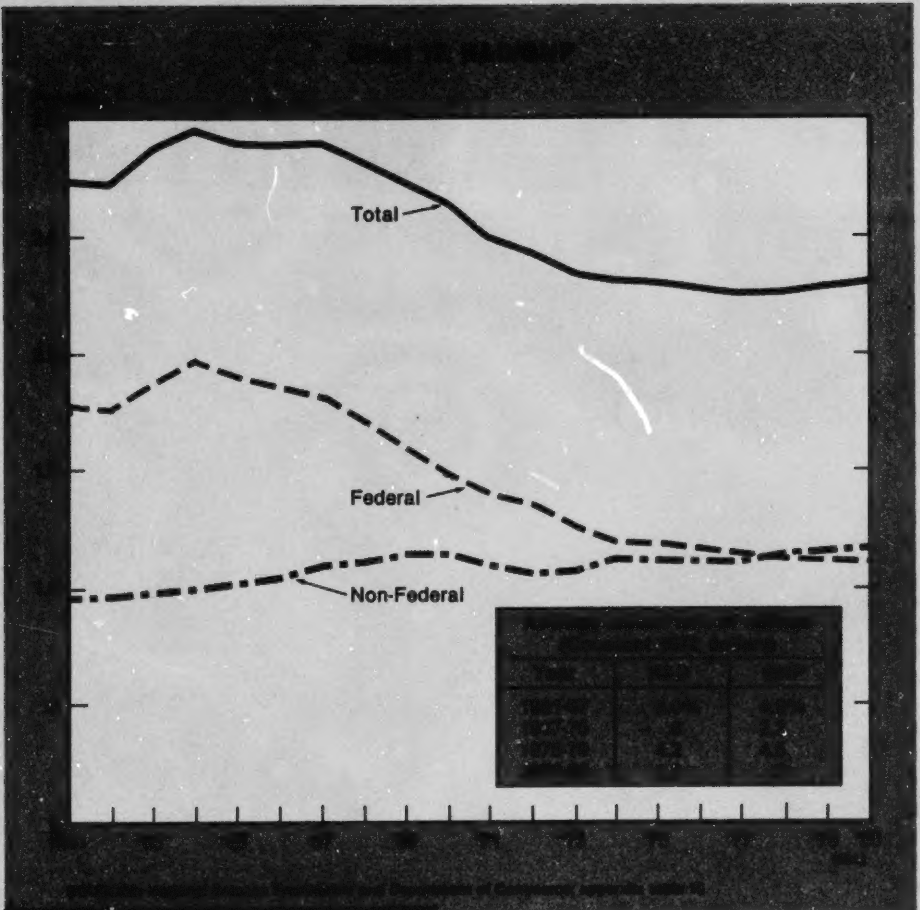
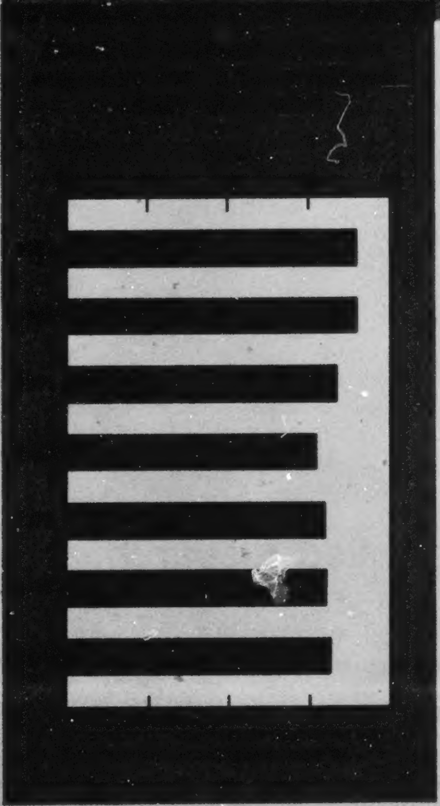
[5] National Science Foundation, 1985 *R&D Funding Projections* (NSF 76-314) (Washington, D.C.: U.S. Government Printing Office, 1976.)

[6] Department of Commerce, op. cit.





research versus development

Since 1975, expenditures for both research and development have increased at about the same rates. Total research spending in the United States in 1980 is expected to reach about $22 billion—for basic research, about $8 billion, and applied research, $14 billion. These levels represent increases of around 13 percent and 11 percent, respectively, over 1979 figures. Development spending is expected to increase to nearly $39 billion, or about 11 percent, between 1979 and 1980 (chart 19). These increases emphasize two points: (1) continuing attempts to strengthen the national basic research effort, and (2) high development costs associated with defense and space efforts.

The Federal Government is expected to be the source of about 55 percent of the Nation's research effort in 1980. This strong support is particularly evident in basic research where the Government is the source of 70 percent of the funds and where other sectors tend to underinvest.[7] The Federal Government is also expected to be the source of 45 percent both of the Nation's applied research and of development. These proportions have changed little since 1975.

In terms of performance, however, major changes occurred between 1975 and 1980. Over this period, proportions of national research and national development performance efforts by Federal intramural groups both dropped; Government-performed research fell from 20 percent to 17 percent, and development from 13 percent to 11 percent. Over the same timespan, industry's performance increased by corresponding amounts. These figures reflect the Government's attempts to contract more of its R&D work to the industrial sector to avoid Federal preemption of private sector efforts, particularly in energy-related work.

basic research

National basic research spending in 1980 is expected to increase by 13 percent over 1979 figures. In real terms basic research spending has increased each year since 1975, averaging 5 percent annually through 1979, with Federal support accounting for over three-fourths of the increase. This upswing contrasts sharply with the trend between 1968 and 1975, when a decrease in Federal defense and space programs caused a near 10-percent (constant dollars) reduction in national basic research spending (chart 20).

The Federal Government is expected to provide 70 percent of all U.S. basic research funds in 1980. An additional 15 percent is likely to come from industry sources, and 10 percent from universities and colleges. Although these proportions have varied little since the late sixties, the factors affecting the proportions have changed radically.

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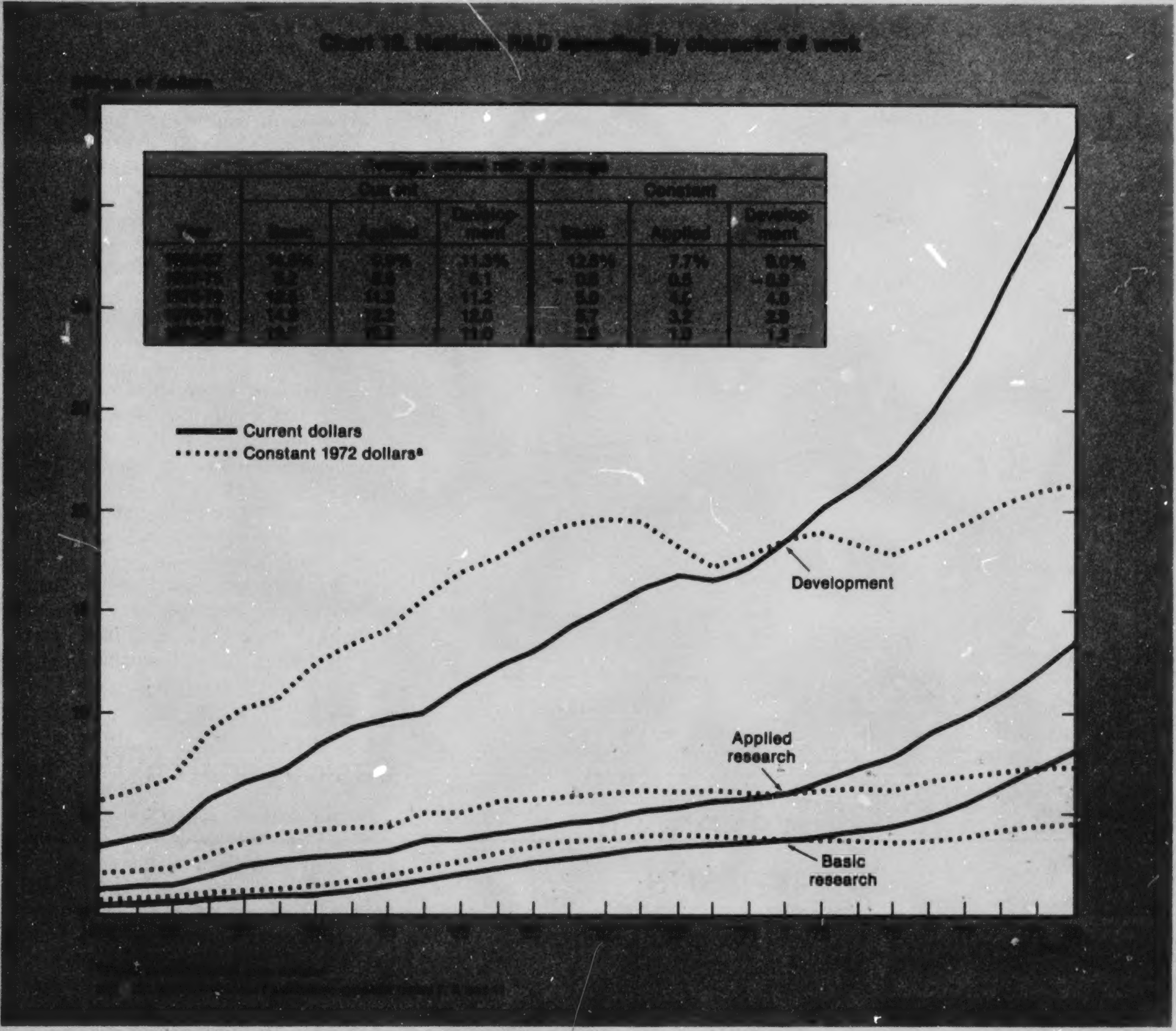
[7] Office of Management and Budget, op. cit.

Chart 10. National R&D spending by character of work



	Average annual rate of change					
	Current			Constant		
Year	Basic	Applied	Develop-ment	Basic	Applied	Develop-ment
[illegible]	[illegible]	[illegible]	11.3%	12.5%	7.7%	9.0%
[illegible]	[illegible]	[illegible]	6.1	[illegible]	0.5	-0.9
[illegible]	[illegible]	11.3	11.2	5.0	4.6	4.0
[illegible]	14.9	12.2	12.0	5.7	3.2	2.8
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1.3

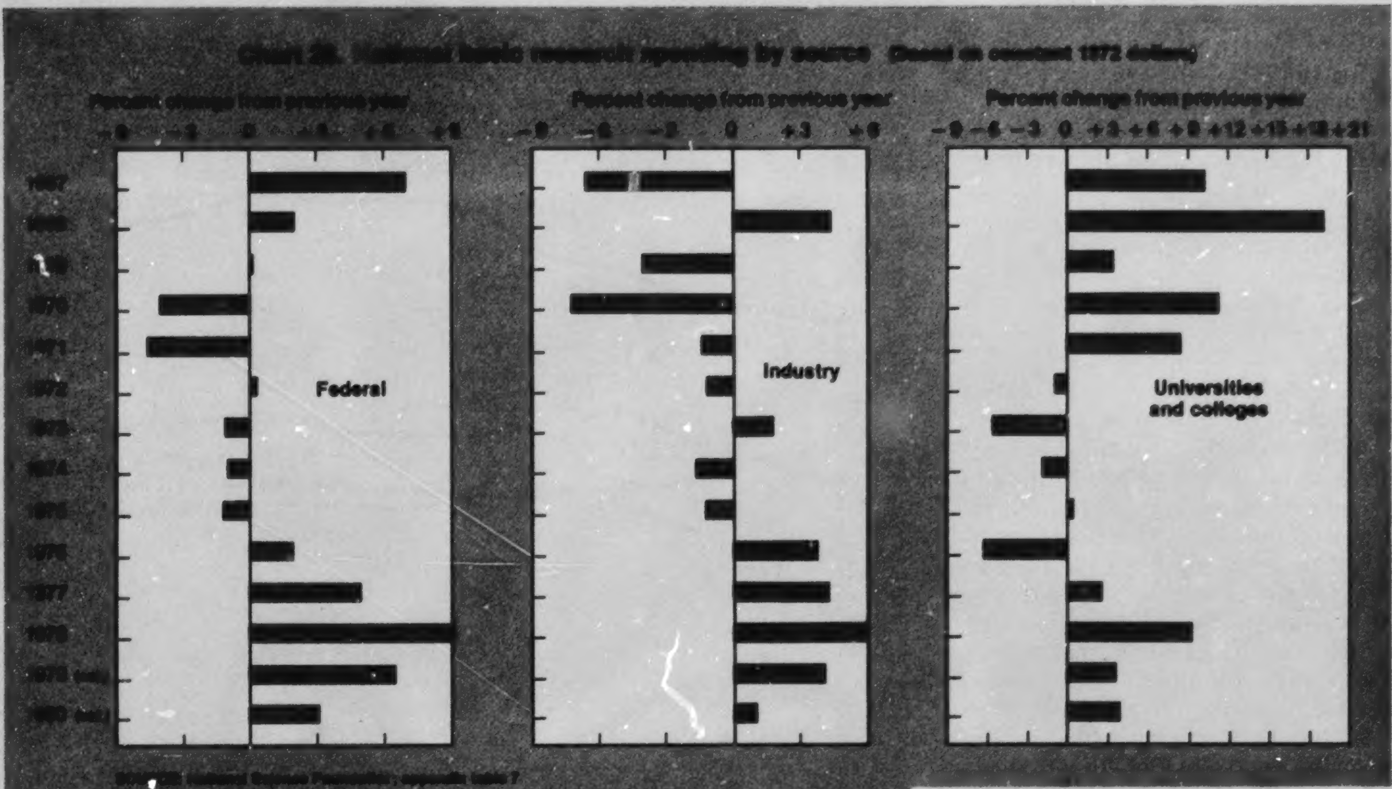
First, the Federal Government has made clear its acceptance of prime responsibility for basic research support; this funding is expected to exceed $5.7 billion in 1980. Recent administrations, emphasizing the need for real year-to-year increases in Federal support of basic research, increased basic research spending in real terms by 25 percent between 1975 and 1979, compared with 12 percent for total Federal R&D funding.

Second, industry, historically the second-largest supporter of basic research, has since the early sixties increasingly emphasized shorter term payoffs from its R&D effort. Industrial support of basic research, however, which still constitutes only 15 percent of the total, has increased in real terms by an annual average of 5 percent between 1975 and 1979. This support has been directed chiefly to energy-related research. This change follows a 10-year period in which basic research spending by industry fell at an average annual rate of 2 percent.

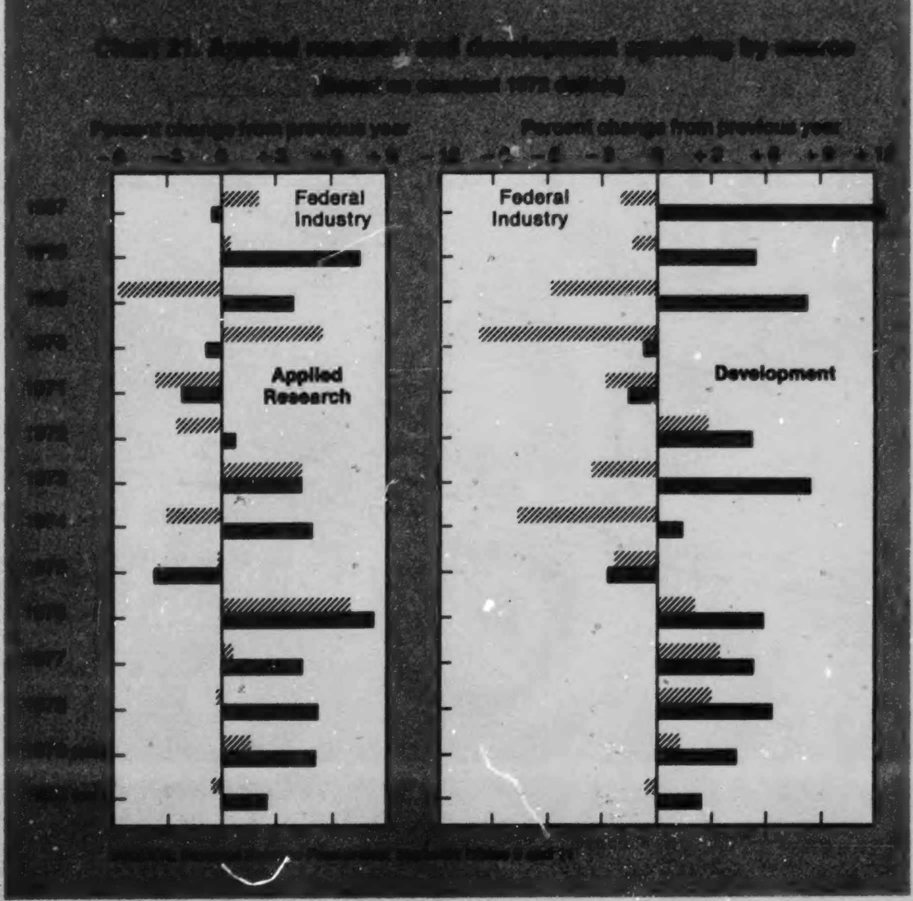
Third, the most dramatic changes have come in the universities and colleges, which are expected to spend $785 million of their non-Federal separately budgeted R&D funds on basic research in 1980. This figure is 60 percent of their non-Federal R&D funds, a ratio that has remained the same since 1976, but is down dramatically from 75 percent in 1970.

applied research

Applied research spending is expected to reach $13.5 billion in 1980, up 11 percent over 1979. Historically, the Federal Government and industry, in that order, have been the primary sources of applied research funds. The greater expenditures for applied research is brought about mainly by increased in-



SOURCE: National Science Foundation, appendix table 7



SOURCE: National Science Foundation, appendix tables [illegible]

dustrial support (chart 21). During this period, industry's funds for applied research rose by a total of 25 percent in real terms, while Federal funds, reflecting a shift in emphasis from applied research to basic research, rose by less than 10 percent. By 1980, industry is expected to be the largest supporter of applied research with nearly 50 percent of the total. Industrial applied research growth has been concentrated in energy-related areas

Federal support for applied research is expected to reach $6.3 billion in 1980. Between 1976 and 1979, Federal support remained about level in real terms. Over this period NASA's applied research spending decreased in constant dollars by more than 20 percent while all other major Federal agencies increased their applied research spending.

development

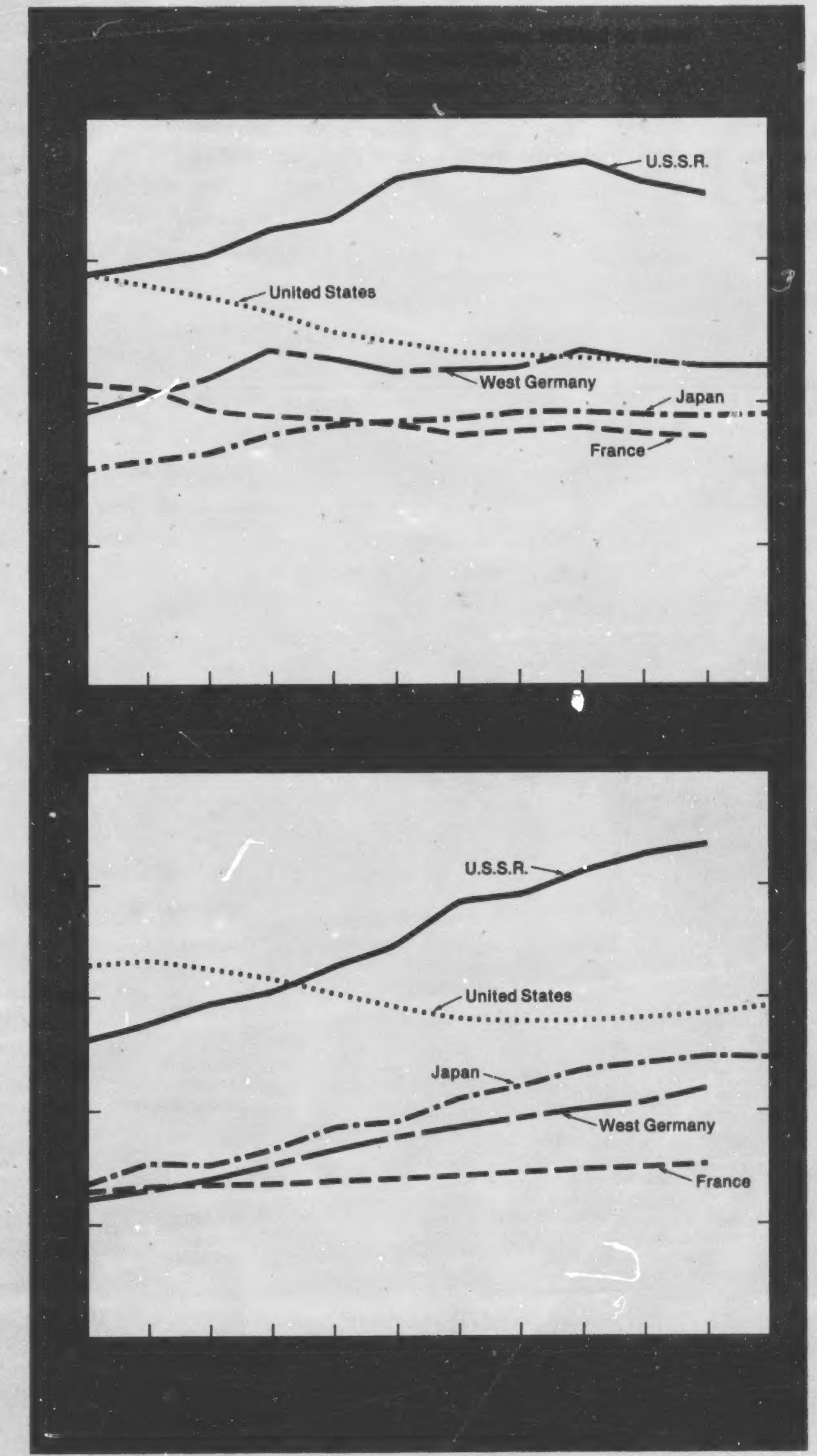
Development accounts for approximately two-thirds of the national R&D effort each year. Also, two-thirds of the R&D scientists and engineers in the economy are employed on development activities. High costs for material and equipment associated with development make this the most expensive area of R&D work. The development effort in 1980 is expected to reach $38.6 billion, 11 percent more than in 1979. Both industry and the Federal Government have increased development spending in real terms each year between 1975 and 1979—5 percent and 2 percent per year, respectively. As in the case of basic research and applied research, the intensified national emphasis on energy has led to these increases.

Industry performs about 85 percent of all the development work in the Nation. In addition to spending some 70 percent of company R&D totals on development, industry performs about 70 percent of the Federal Government's development work. Industrial development performance in 1980 is expected to amount to $33 billion. In recent years, energy and environmental concerns have influenced these funding levels. According to a number of industrial R&D officials, meeting government regulations and requirements has also affected performance funding.

international comparisons

The relative emphasis that different countries place on R&D activities can be approximated by comparing their R&D expenditures to their GNP, or by comparing the numbers of their R&D scientists and engineers to the entire labor force. These ratios overcome difficulties produced by inflation, different unit costs, and differences in size. Because countries differ in their definitions, however, these comparisons should be viewed as approximate, especially for the U.S.S.R.[a]

The United States spends more money on R&D activities than does any other country, and during the sixties had the highest R&D/GNP ratio—in 1964 this ratio reached 3 percent (chart 22). Since that time the U.S. ratio was on the de-



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[a] Data regarding the U.S.S.R. should be treated as rough estimates because differences in Soviet R&D definitions and GNP accounting make international comparisons involving the U.S.S.R. difficult.

cline primarily because of cutbacks in Federal defense and space programs, while the ratios in other countries were on the increase, because of larger year-to-year increases in Government R&D funding. By the midseventies, the U.S. ratio had dropped to 2.3 percent and was exceeded by those of West Germany (2.4 percent) and the U.S.S.R. (3.7 percent). Since the midseventies, the ratios in all countries have leveled or started to drop. In 1977 West Germany had a 2.3-percent ratio; the U.S.S.R., 3.5 percent; France, 1.8 percent; and Japan, 1.9 percent.

Within the United States, a much lower proportion of national R&D funds is devoted to civilian activities (nondefense and nonspace) than is the case in the Organization for Economic Cooperation and Development (OECD) member countries—70 percent in the United States versus an average of 85 percent to 90 percent in OECD countries. When these civilian R&D expenditures are compared with the GNP, the U.S. ratio of 1.5 percent is below the ratios of West Germany (2.2 percent) and Japan (1.9 percent), and equal to that of France.

A pattern different from that of the R&D/GNP ratio is evident in the ratio of FTE R&D scientists and engineers to the labor force. The U.S. ratio of about 60 per 10,000 is exceeded only by that in the U.S.S.R., where about 90 R&D professionals are employed per 10,000 labor force. In the United States, this latter ratio dropped slightly between 1971 and 1974 and has since begun to increase. The ratios in other countries have continued to increase annually since the sixties. The ratio in the United States is expected to continue to increase into the eighties because of the increased national emphasis on defense and the development of alternative energy sources.

The number of R&D scientists and engineers in the United States has been increasing by an average of 3 percent per year since the early seventies. The increases in other countries over the same period have ranged from 2 percent annually in France and West Germany to 5 percent annually in Japan and the U.S.S.R.

appendix

statistical tables

r&d resources

The National Perspective

1. Transfers of funds expended annually for performance of research and development by sector, distributed by source: 1953 and 1960-80 25
2. Transfers of funds expended annually for performance of basic research by sector, distributed by source: 1953 and 1960-80 26
3. Transfers of funds expended annually for performance of applied research by sector, distributed by source: 1953 and 1960-80 27
4. Transfers of funds expended annually for performance of development by sector, distributed by source: 1953 and 1960-80 28
5. Sources of funds for research and development by sector: 1953 and 1960-80 29
6. Research and development performance by sector: 1953 and 1960-80 29
7. Sources of funds used for basic research by sector: 1953 and 1960-80 30
8. Basic research performance by sector: 1953 and 1960-80 30
9. Sources of funds used for applied research by sector: 1953 and 1960-80 31
10. Applied research performance by sector: 1953 and 1960-80 31
11. Sources of funds used for development by sector: 1953 and 1960-80 32
12. Development performance by sector: 1953 and 1960-80 32
13. Trends in Federal and non-Federal R&D outlays: 1953 and 1960-80 33
14. Full-time-equivalent scientists and engineers employed in research and development by sector: selected years 33
15. National R&D expenditures as a percent of gross national production by source: 1961-80 34
16. R&D scientists and engineers and employed civilian labor force: selected years 34
17. National R&D expenditures as a percent of gross national product by selected country: 1967-78 34
18. R&D scientists and engineers per 10,000 labor force population by country: 1967-78 34
19. Estimated ratio of civilian R&D expenditures to gross national product for selected countries: 1967-76 34

The Federal Government

20. Federal outlays for research, development, and R&D plant by agency: fiscal years 1971-80 35
21. Federal obligations for research and development by agency: fiscal years 1971-80 35

21a. Federal R&D funding by budget function: fiscal years 1971-80 36

22. Federal obligations for research and development by character of work: fiscal years 1971-80 36
23. Federal obligations for research and development by performer: fiscal years 1971-80 36
24. Federal obligations for research by agency: fiscal years 1971-80 37
25. Federal obligations for research by performer: fiscal years 1971-80 37
26. Federal obligations for research by field of science: fiscal years 1971-80 38
27. Federal obligations for basic research by agency: fiscal years 1971-80 38
28. Federal obligations for basic research by performer: fiscal years 1971-80 39
29. Federal obligations for basic research by fields of science: fiscal years 1971-80 39
30. Federal obligations for applied research by agency: fiscal years 1971-80 40
31. Federal obligations for applied research by performer: fiscal years 1971-80 40
32. Federal obligations for applied research by field of science: fiscal years 1971-80 41
33. Federal obligations for development by agency: fiscal years 1971-80 41
34. Federal obligations for development by performer: fiscal years 1971-80 42
35. R&D scientists and engineers employed in the Federal Government by broad field categories: selected years 42

Industry

36. Funds for industrial R&D performance by source: 1968-79 43
37. Funds for industrial R&D performance by industry: 1968-79 43
38. Federal funds for industrial R&D performance by industry: 1968-78 44
39. Company funds for industrial R&D performance by industry: 1968-78 45
40. R&D funds as percent of net sales in R&D-performing manufacturing companies by industry: 1968-78 46
41. Company R&D funds as percent of net sales in R&D-performing manufacturing companies by industry: 1968-78 47
42. Funds for the performance of industrial basic research by industry: 1968-77 48
43. Funds for the performance of industrial basic research by field by science: 1968-77 48

44. Funds for the performance of industrial applied research: 1971-79 48

45. Funds for the performance of applied research and development by product field: 1968-77 49

46. Funds for industrial energy R&D performance by primary energy source: 1972-78 50

47. Funds for industrial pollution abatement R&D performance by type of pollution and source of funds: 1973-80 50

48. Full-time-equivalent number of R&D scientists and engineers by industry: 1968-79 51

49. Full-time-equivalent R&D scientists and engineers per 1,000 employees by industry: 1968-77 52

Universities and Colleges

50. R&D expenditures at universities and colleges by source and field: fiscal years 1968-78 53

51. R&D expenditures at universities and colleges by source and character of work: fiscal years 1968-78 53

52. R&D expenditures at doctorate-granting institutions by source and field: fiscal years 1968-78 54

53. Federally financed R&D expenditures at universities and colleges by field: fiscal years 1968-78 55

54. Federally financed R&D expenditures at doctorate-granting institutions by field: fiscal years 1968-78 55

55. Total and federally financed capital expenditures for scientific activities at universities and colleges by source and field: fiscal years 1968-77 56

56. Total and federally financed capital expenditures for scientific activities at doctorate-granting institutions by source and field: fiscal years 1968-77 56

57. R&D expenditures of university-administered federally funded research and development centers: fiscal years 1968-78 57

58. R&D expenditures at university-administered federally funded research and development centers by field: fiscal years 1968-78 57

59. R&D expenditures at university-administered federally funded research and development centers by character of work: fiscal years 1968-78 58

60. Postdoctorates in doctorate-granting institutions by field and source of support: fall 1974-77 59

61. Research assistantships in doctorate-granting institutions by field and source of support: fall 1974-77 60

62. Full-time-equivalent R&D scientists and engineers at universities and colleges by field: 1969-79 61

63. Full-time-equivalent scientists and engineers at universities and colleges by field: 1969 and 1979 61

64. Full-time-equivalent scientists and engineers employed in universities and colleges by field and type of activity: 1978-79 61

65. Full-time-equivalent scientists and engineers employed in doctorate-granting institutions by field and type of activity: 1978-79 62

science and engineering personnel

Current Supply and Utilization Patterns of S/E Population

66. Scientists and engineers by field, employment status, and sex: 1974, 1976, and 1978 63

67. Scientists and engineers, by field, labor force status, and sex: 1974, 1976, and 1978 63

68. Scientists and engineers by field, sex, and type of employer: 1974, 1976, and 1978 64

69. Scientists and engineers by field, sex, and primary work activity: 1974, 1976, and 1978 64

70. Scientists and engineers by field, employment status, and race: 1974-78 65

Doctorate Scientists and Engineers

71. Selected characteristics of employed doctoral scientists ad engineers in the U.S. 66

72. Employed doctoral scientists and engineers by field and type of employer: 1973, 1975, and 1977 67

73. Doctoral scientists and engineers by type of employer and primary work activity: 1973, 1975, and 1977 67

74. Selected characteristics of employed women doctoral scientists and engineers in the U.S. 68

75. Doctoral scientists and engineers by field and race: 1977 69

76. Doctoral scientists and engineers by race, primary work activity, and type of employer: 1977 69

77. Projected changes in doctoral scientists and engineers: 1977-87 69

78. Projected full-time labor force of doctoral scientists and engineers: 1982 and 1987 69

79. Percent of science/engineering doctorates in non-science/engineering employment: projections 69

Dynamics of Science and Engineering Labor Market

80. Bachelor's and first-professional degrees awarded by field: 1960-78 70

81. Master's degrees awarded by field: 1960-78 71

82. Doctoral degrees awarded by field: 1965-78 72

83. Employed 1976 science/engineering graduates by field of employment in 1978 and level of degree 72

84. Occupational mobility: 1972 scientists and engineers as employed in 1978 73

85. Supply of scientists and engineers: 1976, 1978, and 1980 73

Table 1. Transfers of funds expended annually for performance of research and development by sector, distributed by source: 1953 and 1960-80[1]

[Dollars in millions]

Year	Total R&D	Federal Government		Industry[2]			Universities and colleges					Associated FFRDC's[3]		Other nonprofit institutions[2]			
		Total funds used	[redacted]	Total funds used	[redacted]	[redacted]	Total funds used	[redacted]	[redacted]	[redacted]	[redacted]	Total funds used	[redacted]	Total funds used	[redacted]	[redacted]	[redacted]
1953	5,124	1,010	[redacted]	3,630	[redacted]	[redacted]	255	[redacted]	[redacted]	[redacted]	[redacted]	121	[redacted]	108	[redacted]	[redacted]	[redacted]
1960[5]	13,523	1,726	[redacted]	10,509	[redacted]	[redacted]	646	[redacted]	[redacted]	[redacted]	[redacted]	360	[redacted]	262	[redacted]	[redacted]	[redacted]
1961	14,316	1,874	[redacted]	10,908	[redacted]	[redacted]	763	[redacted]	[redacted]	[redacted]	[redacted]	410	[redacted]	361	[redacted]	[redacted]	[redacted]
1962	15,394	2,098	[redacted]	11,464	[redacted]	[redacted]	904	[redacted]	[redacted]	[redacted]	[redacted]	470	[redacted]	458	[redacted]	[redacted]	[redacted]
1963	17,059	2,279	[redacted]	12,630	[redacted]	[redacted]	1,081	[redacted]	[redacted]	[redacted]	[redacted]	530	[redacted]	539	[redacted]	[redacted]	[redacted]
1964	18,854	2,838	[redacted]	13,512	[redacted]	[redacted]	1,275	[redacted]	[redacted]	[redacted]	[redacted]	629	[redacted]	600	[redacted]	[redacted]	[redacted]
1965	20,044	3,093	[redacted]	14,185	[redacted]	[redacted]	1,474	[redacted]	[redacted]	[redacted]	[redacted]	629	[redacted]	663	[redacted]	[redacted]	[redacted]
1966	21,846	3,220	[redacted]	15,548	[redacted]	[redacted]	1,715	[redacted]	[redacted]	[redacted]	[redacted]	630	[redacted]	733	[redacted]	[redacted]	[redacted]
1967	23,146	3,396	[redacted]	16,385	[redacted]	[redacted]	1,921	[redacted]	[redacted]	[redacted]	[redacted]	673	[redacted]	771	[redacted]	[redacted]	[redacted]
1968	24,604	3,493	[redacted]	17,429	[redacted]	[redacted]	2,149	[redacted]	[redacted]	[redacted]	[redacted]	719	[redacted]	814	[redacted]	[redacted]	[redacted]
1969	25,631	3,503	[redacted]	18,308	[redacted]	[redacted]	2,225	[redacted]	[redacted]	[redacted]	[redacted]	725	[redacted]	870	[redacted]	[redacted]	[redacted]
1970	25,910	3,855	[redacted]	18,067	[redacted]	[redacted]	2,335	[redacted]	[redacted]	[redacted]	[redacted]	737	[redacted]	916	[redacted]	[redacted]	[redacted]
1971	26,604	4,156	[redacted]	18,320	[redacted]	[redacted]	2,500	[redacted]	[redacted]	[redacted]	[redacted]	716	[redacted]	912	[redacted]	[redacted]	[redacted]
1972	28,426	4,482	[redacted]	19,552	[redacted]	[redacted]	2,676	[redacted]	[redacted]	[redacted]	[redacted]	764	[redacted]	952	[redacted]	[redacted]	[redacted]
1973	30,631	4,619	[redacted]	21,249	[redacted]	[redacted]	2,940	[redacted]	[redacted]	[redacted]	[redacted]	817	[redacted]	1,006	[redacted]	[redacted]	[redacted]
1974	32,768	4,815	[redacted]	22,887	[redacted]	[redacted]	3,023	[redacted]	[redacted]	[redacted]	[redacted]	865	[redacted]	1,178	[redacted]	[redacted]	[redacted]
1975	35,256	5,397	[redacted]	24,187	[redacted]	[redacted]	3,409	[redacted]	[redacted]	[redacted]	[redacted]	987	[redacted]	1,276	[redacted]	[redacted]	[redacted]
1976	38,960	5,710	[redacted]	26,997	[redacted]	[redacted]	3,730	[redacted]	[redacted]	[redacted]	[redacted]	1,147	[redacted]	1,376	[redacted]	[redacted]	[redacted]
1977	43,013	6,142	[redacted]	29,928	[redacted]	[redacted]	4,064	[redacted]	[redacted]	[redacted]	[redacted]	1,384	[redacted]	1,495	[redacted]	[redacted]	[redacted]
1978	48,286	6,882	[redacted]	33,400	[redacted]	[redacted]	4,615	[redacted]	[redacted]	[redacted]	[redacted]	1,717	[redacted]	1,672	[redacted]	[redacted]	[redacted]
1979 (prelim.)	54,298	7,500	[redacted]	37,822	[redacted]	[redacted]	5,340	[redacted]	[redacted]	[redacted]	[redacted]	1,840	[redacted]	1,994	[redacted]	[redacted]	[redacted]
1980 (est.) ..	60,375	7,830	[redacted]	42,250	[redacted]	[redacted]	6,050	[redacted]	[redacted]	[redacted]	[redacted]	2,000	[redacted]	2,245	[redacted]	[redacted]	[redacted]

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[1] All data are based on reports by performers.

[2] Expenditures for federally funded research and development centers (FFRDC's) administered by both industry and by nonprofit institutions are included in the totals of the respective sectors.

[3] FFRDC's administered by individual universities and colleges and by university consortia.

[4] Includes State and local government funds.

[5] Data for 1954-59 can be found in *National Patterns of R&D Resources, 1953-77* (NSF 77-310).

SOURCE: National Science Foundation.

Table 2. Transfers of funds expended annually for performance of basic research by sector, distributed by source: 1953 and 1960-80[1]

[Dollars in millions]

Year	Total basic research	Federal Government		Industry[2]			Universities and colleges					Associated FFRDC's[3]		Other nonprofit institutions[2]			
			Source		Sources			Sources					Source		Sources		
		Total funds used	Federal Government	Total funds used	Federal Government	Industry[4]	Total funds used	Federal Government	Industry	Universities and colleges[4]	Other nonprofit institutions	Total funds used	Federal Government	Total funds used	Federal Government	Industry	Other nonprofit institutions[4]
1953	441	101	101	151	18	133	110	73	12	10	15	33	33	46	25	9	12
1960[5]	1,197	160	160	376	79	297	433	299	24	72	38	97	97	131	80	21	30
1961	1,401	206	206	395	81	314	536	382	26	85	44	115	115	149	90	22	37
1962	1,724	251	251	488	140	348	659	451	25	102	81	136	136	190	120	24	46
1963	1,965	255	255	522	147	375	814	610	26	123	55	159	159	215	140	25	50
1964	2,289	314	314	549	165	384	1,003	767	25	144	67	191	191	232	160	25	47
1965	2,556	364	364	592	166	426	1,138	879	26	164	69	208	208	253	172	29	52
1966	2,814	385	385	624	173	451	1,303	1,026	27	179	71	227	227	275	185	32	58
1967	3,039	418	418	629	202	427	1,457	1,124	31	223	79	250	250	285	190	34	61
1968	3,274	410	410	642	160	482	1,649	1,261	36	270	82	276	276	297	197	37	63
1969	3,425	516	516	618	155	463	1,711	1,278	30	308	95	275	275	305	195	43	67
1970	3,513	541	541	602	158	444	1,796	1,286	40	360	110	269	269	305	189	44	72
1971	3,577	491	491	590	134	456	1,914	1,349	46	400	119	260	260	322	200	45	77
1972	3,748	538	538	593	130	463	2,022	1,421	53	414	134	250	250	345	214	47	84
1973	3,877	537	537	631	132	499	2,055	1,456	57	408	134	297	297	357	218	49	90
1974	4,153	611	611	699	163	536	2,153	1,522	61	432	138	285	285	405	245	54	106
1975	4,556	682	682	730	157	573	2,410	1,694	73	478	165	309	309	425	245	60	120
1976	4,908	719	719	819	185	634	2,547	1,827	72	481	167	359	359	464	266	64	134
1977	5,476	866	866	911	210	701	2,787	1,962	62	577	186	402	402	510	260	70	180
1978	6,357	1,047	1,047	1,040	280	760	3,185	2,257	100	614	214	500	500	585	325	90	170
1979 (prelim.)	7,305	1,150	1,150	1,180	280	900	3,745	2,700	115	690	240	550	550	680	400	95	185
1980 (est.)	8,230	1,210	1,210	1,325	325	1,000	4,275	3,100	125	785	265	650	650	770	460	95	215

[1] All data are based on reports by performers.

[2] Expenditure for federally funded research and development centers (FFRDC's) administered by both industry and by nonprofit institutions are included in the totals of the respective sectors.

[3] FFRDC's administered by individual universities and colleges and by university consortia.

[4] Includes State and local government funds.

[5] Data for 1954-59 can be found in *National Patterns of R&D Resources, 1953-77* (NSF 77-310).

NA = Not available.

SOURCE: National Science Foundation.

Table 3. Transfers of funds expended annually for performance of applied research by sector, distributed by source: 1953 and 1960-80[1]

[Dollars in millions]

Year	Total applied research	Federal Government: Total funds used	Federal Government: Source: Federal Government	Industry[2]: Total funds used	Industry[2]: Sources: Federal Government	Industry[2]: Sources: Industry[4]	Universities and colleges: Total funds used	Universities and colleges: Sources: Federal Government	Universities and colleges: Sources: Industry	Universities and colleges: Sources: Universities and colleges[4]	Universities and colleges: Sources: Other nonprofit institutions	Associated FFRDC's[3]: Total funds used	Associated FFRDC's[3]: Source: Federal Government	Other nonprofit institutions[2]: Total funds used	Other nonprofit institutions[2]: Sources: Federal Government	Other nonprofit institutions[2]: Sources: Industry	Other nonprofit institutions[2]: Sources: Other nonprofit institutions[2]
1953	1,279	345	[illegible]	726	[illegible]	[illegible]	130	37	6	67	20	44	[illegible]	34	13	11	10
1960[5]	3,020	595	[illegible]	2,029	[illegible]	[illegible]	179	[illegible]	13	[illegible]	12	122	[illegible]	95	[illegible]	17	[illegible]
1961	3,065	634	634	1,977	812	[illegible]	192	[illegible]	13	[illegible]	12	135	[illegible]	127	[illegible]	17	[illegible]
1962	3,665	702	[illegible]	2,449	1,011	[illegible]	205	[illegible]	13	[illegible]	13	156	[illegible]	154	[illegible]	[illegible]	[illegible]
1963	3,742	715	715	2,457	1,007	[illegible]	227	128	14	72	13	170	[illegible]	173	[illegible]	[illegible]	[illegible]
1964	4,128	903	[illegible]	2,600	1,040	[illegible]	232	127	14	77	14	202	[illegible]	191	[illegible]	[illegible]	47
1965	4,339	990	[illegible]	2,658	[illegible]	[illegible]	279	157	13	[illegible]	21	204	[illegible]	208	[illegible]	[illegible]	[illegible]
1966	4,601	997	[illegible]	2,843	[illegible]	[illegible]	328	184	13	[illegible]	31	207	[illegible]	226	[illegible]	[illegible]	[illegible]
1967	4,803	1,050	[illegible]	2,915	[illegible]	[illegible]	374	[illegible]	19	162	[illegible]	219	[illegible]	245	[illegible]	[illegible]	[illegible]
1968	5,162	1,141	1,141	3,124	[illegible]	[illegible]	404	[illegible]	[illegible]	97	[illegible]	231	[illegible]	262	[illegible]	[illegible]	[illegible]
1969	5,342	1,140	1,140	3,287	[illegible]	2,272	407	[illegible]	16	[illegible]	[illegible]	210	[illegible]	298	[illegible]	[illegible]	[illegible]
1970	5,714	1,321	[illegible]	3,427	[illegible]	[illegible]	427	[illegible]	16	[illegible]	[illegible]	216	[illegible]	323	[illegible]	[illegible]	[illegible]
1971	5,845	1,408	[illegible]	3,415	[illegible]	[illegible]	474	[illegible]	19	115	[illegible]	210	[illegible]	338	[illegible]	[illegible]	[illegible]
1972	6,054	1,405	[illegible]	3,514	[illegible]	[illegible]	544	[illegible]	19	141	[illegible]	226	[illegible]	365	[illegible]	[illegible]	[illegible]
1973	6,680	1,559	[illegible]	3,825	[illegible]	[illegible]	717	[illegible]	[illegible]	174	[illegible]	226	[illegible]	353	[illegible]	[illegible]	[illegible]
1974	7,353	1,698	[illegible]	4,288	[illegible]	[illegible]	737	[illegible]	[illegible]	[illegible]	[illegible]	217	[illegible]	413	[illegible]	[illegible]	[illegible]
1975	7,950	1,817	[illegible]	4,570	[illegible]	[illegible]	851	[illegible]	[illegible]	[illegible]	[illegible]	264	[illegible]	448	[illegible]	[illegible]	[illegible]
1976	9,101	2,149	[illegible]	5,112	[illegible]	[illegible]	1,015	[illegible]	43	[illegible]	101	327	[illegible]	498	[illegible]	[illegible]	[illegible]
1977	9,893	2,171	2,171	5,656	[illegible]	[illegible]	1,068	[illegible]	[illegible]	[illegible]	[illegible]	465	[illegible]	533	[illegible]	[illegible]	[illegible]
1978	10,862	2,170	2,170	6,390	[illegible]	[illegible]	1,195	[illegible]	[illegible]	[illegible]	[illegible]	517	[illegible]	590	[illegible]	[illegible]	[illegible]
1979 (prelim.)	12,190	2,380	[illegible]	7,230	[illegible]	[illegible]	1,330	[illegible]	[illegible]	[illegible]	[illegible]	540	[illegible]	710	[illegible]	[illegible]	[illegible]
1980 (est.) ..	13,505	2,520	[illegible]	8,125	[illegible]	[illegible]	1,480	[illegible]	[illegible]	[illegible]	[illegible]	575	[illegible]	805	[illegible]	[illegible]	[illegible]

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[1] All data are based on reports by performers.

[2] Expenditures for federally funded research and development centers (FFRDC's) administered by both industry and by nonprofit institutions are included in the totals of the respective sectors.

[3] FFRDC's administered by individual universities and colleges and by university consortia.

[4] Includes State and local government funds.

[5] Data for 1954-59 can be found in *National Patterns of R&D Resources, 1953-77* (NSF 77-310).

NA = Not available.

SOURCE: National Science Foundation.

Table 4. Transfers of funds expended annually for performance of development by sector, distributed by source: 1953 and 1960-80[1]

[Dollars in millions]

Year	Total development	Federal Government		Industry[2]			Universities and colleges					Associated FFRDC's[3]		Other nonprofit institutions[2]			
		Total funds used	Source	Total funds used	Sources		Total funds used	Sources				Total funds used	Source	Total funds used	Sources		
			Federal Government		Federal Government	Industry[4]		Federal Government	Industry	Universities and colleges[4]	Other nonprofit institutions		Federal Government		Federal Government	Industry	Other nonprofit institutions[4]
1953	3,404	564	[illegible]	2,753	[illegible]	[illegible]	15	[illegible]	[illegible]	[illegible]	[illegible]	44	[illegible]	28	[illegible]	[illegible]	[illegible]
1960[5]	9,308	971	[illegible]	8,104	[illegible]	[illegible]	34	[illegible]	[illegible]	[illegible]	[illegible]	141	[illegible]	56	[illegible]	[illegible]	[illegible]
1961	9,850	1,034	[illegible]	8,536	[illegible]	[illegible]	35	[illegible]	[illegible]	[illegible]	[illegible]	160	[illegible]	85	[illegible]	[illegible]	[illegible]
1962	10,005	1,145	[illegible]	8,527	[illegible]	[illegible]	40	[illegible]	[illegible]	[illegible]	[illegible]	179	[illegible]	114	[illegible]	[illegible]	[illegible]
1963	11,352	1,309	[illegible]	9,651	[illegible]	[illegible]	40	[illegible]	[illegible]	[illegible]	[illegible]	201	[illegible]	151	[illegible]	[illegible]	[illegible]
1964	12,437	1,621	[illegible]	10,363	[illegible]	[illegible]	40	[illegible]	[illegible]	[illegible]	[illegible]	236	[illegible]	177	[illegible]	[illegible]	[illegible]
1965	13,150	1,739	[illegible]	10,935	[illegible]	[illegible]	57	[illegible]	[illegible]	[illegible]	[illegible]	217	[illegible]	202	[illegible]	[illegible]	[illegible]
1966	14,431	1,838	[illegible]	12,081	[illegible]	[illegible]	84	[illegible]	[illegible]	[illegible]	[illegible]	196	[illegible]	232	[illegible]	[illegible]	[illegible]
1967	15,304	1,928	[illegible]	12,841	[illegible]	[illegible]	90	[illegible]	[illegible]	[illegible]	[illegible]	204	[illegible]	241	[illegible]	[illegible]	[illegible]
1968	16,168	1,942	[illegible]	13,663	[illegible]	[illegible]	96	[illegible]	[illegible]	[illegible]	[illegible]	212	[illegible]	255	[illegible]	[illegible]	[illegible]
1969	16,864	1,847	[illegible]	14,403	[illegible]	[illegible]	107	[illegible]	[illegible]	[illegible]	[illegible]	240	[illegible]	267	[illegible]	[illegible]	[illegible]
1970	16,683	1,993	[illegible]	14,038	[illegible]	[illegible]	112	[illegible]	[illegible]	[illegible]	[illegible]	252	[illegible]	288	[illegible]	[illegible]	[illegible]
1971	17,182	2,257	[illegible]	14,315	[illegible]	[illegible]	112	[illegible]	[illegible]	[illegible]	[illegible]	246	[illegible]	252	[illegible]	[illegible]	[illegible]
1972	18,624	2,539	[illegible]	15,445	[illegible]	[illegible]	110	[illegible]	[illegible]	[illegible]	[illegible]	288	[illegible]	242	[illegible]	[illegible]	[illegible]
1973	20,074	2,523	[illegible]	16,793	[illegible]	[illegible]	168	[illegible]	[illegible]	[illegible]	[illegible]	294	[illegible]	296	[illegible]	[illegible]	[illegible]
1974	21,262	2,506	[illegible]	17,900	[illegible]	[illegible]	133	[illegible]	[illegible]	[illegible]	[illegible]	363	[illegible]	380	[illegible]	[illegible]	[illegible]
1975	22,750	2,898	[illegible]	18,887	[illegible]	[illegible]	148	[illegible]	[illegible]	[illegible]	[illegible]	414	[illegible]	403	[illegible]	[illegible]	[illegible]
1976	24,951	2,842	[illegible]	21,066	[illegible]	[illegible]	168	[illegible]	[illegible]	[illegible]	[illegible]	461	[illegible]	414	[illegible]	[illegible]	[illegible]
1977	27,644	3,106	[illegible]	23,361	[illegible]	[illegible]	209	[illegible]	[illegible]	[illegible]	[illegible]	517	[illegible]	452	[illegible]	[illegible]	[illegible]
1978	31,067	3,665	[illegible]	25,970	[illegible]	[illegible]	235	[illegible]	[illegible]	[illegible]	[illegible]	700	[illegible]	497	[illegible]	[illegible]	[illegible]
1979 (prelim.)	34,801	3,970	[illegible]	29,212	[illegible]	[illegible]	265	[illegible]	[illegible]	[illegible]	[illegible]	750	[illegible]	604	[illegible]	[illegible]	[illegible]
1980 (est.) ..	38,640	4,100	[illegible]	32,800	[illegible]	[illegible]	295	[illegible]	[illegible]	[illegible]	[illegible]	775	[illegible]	670	[illegible]	[illegible]	[illegible]

[1] Data are based on reports by performers.

[2] Expenditures for federally funded research and development centers (FFRDC's) administered by both industry and by nonprofit institutions are included in the totals of the respective sectors.

[3] FFRDC's administered by individual universities and colleges and by university consortia.

[4] Includes State and local government funds.

[5] Data for 1954-59 can be found in *National Patterns of R&D Resources, 1953-77* (NSF 77-310).

NA = Not available.

SOURCE: National Science Foundation.

Table 5. Sources of funds for research and development by sector: 1953 and 1960–80

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	5,124	2,753	2,245	72	54
1960	13,523	8,738	4,516	149	120
1961	14,316	9,250	4,757	165	144
1962	15,394	9,911	5,123	185	175
1963	17,059	11,204	5,456	207	192
1964	18,854	12,536	5,888	235	195
1965	20,044	13,012	6,548	267	217
1966	21,846	13,969	7,328	303	246
1967	23,146	14,395	8,142	345	264
1968	24,604	14,927	9,005	390	282
1969	25,631	14,895	10,010	420	306
1970	25,910	14,668	10,444	461	337
1971	26,604	14,892	10,822	529	361
1972	28,426	15,755	11,711	575	385
1973	30,631	16,309	13,294	615	413
1974	32,768	16,754	14,878	677	459
1975	35,256	18,152	15,820	750	534
1976	38,960	19,844	17,694	821	601
1977	43,013	21,751	19,696	893	673
1978	48,286	24,058	22,433	1,029	766
1979 (prelim)	54,296	26,762	25,520	1,150	864
1980 (est.)	60,375	29,400	28,710	1,300	965

Constant 1972 dollars[1]

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	8,666	4,643	3,812	120	91
1960	19,649	12,681	6,578	215	175
1961	20,600	13,292	6,866	235	207
1962	21,768	14,000	7,261	259	248
1963	23,761	15,589	7,620	285	267
1964	25,859	17,174	8,097	320	268
1965	26,914	17,457	8,810	356	291
1966	28,444	18,183	9,547	394	320
1967	29,252	18,182	10,304	434	332
1968	29,825	18,103	10,906	474	342
1969	29,606	17,221	11,544	488	353
1970	28,400	16,090	11,433	507	370
1971	27,739	15,540	11,271	553	375
1972	28,426	15,755	11,711	575	385
1973	29,063	15,513	12,567	590	393
1974	28,476	14,647	12,826	601	402
1975	27,888	14,417	12,444	603	424
1976	29,165	14,865	13,234	617	449
1977	30,316	15,314	13,900	627	475
1978	31,756	15,822	14,754	677	503
1979 (prelim)	32,823	16,185	15,420	696	522
1980 (est.)	33,264	16,215	15,799	718	532

[1] Based on GNP implicit price deflator.
SOURCE: National Science Foundation.

Table 6. Research and development performance by sector: 1953 and 1960–80

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	5,124	1,010	3,630	255	121	106
1960	13,523	1,726	10,509	646	360	282
1961	14,316	1,874	10,908	763	410	361
1962	15,394	2,098	11,464	904	470	458
1963	17,059	2,279	12,630	1,081	530	539
1964	18,854	2,838	13,512	1,275	629	600
1965	20,044	3,093	14,185	1,474	629	663
1966	21,846	3,220	15,548	1,715	630	733
1967	23,146	3,396	16,385	1,921	673	771
1968	24,604	3,493	17,429	2,149	719	814
1969	25,631	3,503	18,306	2,225	725	870
1970	25,910	3,855	18,067	2,335	737	916
1971	26,604	4,156	18,320	2,500	716	912
1972	28,426	4,482	19,552	2,676	764	952
1973	30,631	4,619	21,249	2,940	817	1,006
1974	32,768	4,815	22,887	3,023	865	1,178
1975	35,256	5,397	24,187	3,409	987	1,276
1976	38,960	5,710	26,997	3,730	1,147	1,376
1977	43,013	6,142	29,928	4,064	1,384	1,495
1978	48,286	6,882	33,400	4,615	1,717	1,672
1979 (prelim)	54,296	7,500	37,622	5,340	1,840	1,994
1980 (est.)	60,375	7,830	42,350	6,050	2,000	2,245

Constant 1972 dollars[1]

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	8,666	1,691	6,164	426	203	182
1960	19,649	2,483	15,304	931	519	412
1961	20,600	2,665	15,745	1,085	584	521
1962	21,768	2,942	16,249	1,268	659	650
1963	23,761	3,144	17,642	1,490	731	754
1964	25,859	3,859	18,583	1,735	856	826
1965	26,914	4,129	19,086	1,967	840	892
1966	28,444	4,185	20,256	2,229	819	955
1967	29,252	4,276	20,735	2,418	848	975
1968	29,825	4,245	21,108	2,613	874	985
1969	29,606	4,066	21,111	2,583	842	1,004
1970	28,400	4,240	19,777	2,568	811	1,004
1971	27,739	4,348	19,080	2,613	749	949
1972	28,426	4,482	19,552	2,676	764	952
1973	29,063	4,425	20,085	2,819	784	950
1974	28,476	4,280	19,726	2,686	789	1,015
1975	27,888	4,332	19,022	2,738	792	1,004
1976	29,165	4,286	20,190	2,800	860	1,029
1977	30,316	4,314	21,120	2,855	972	1,055
1978	31,756	4,527	21,965	3,035	1,129	1,100
1979 (prelim)	32,823	4,540	22,732	3,232	1,114	1,205
1980 (est)	33,264	4,329	23,250	3,343	1,105	1,237

[1] Based on GNP implicit price deflator.
SOURCE: National Science Foundation.

Table 7. Sources of funds used for basic research by sector: 1953 and 1960–80

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	441	251	153	10	27
1960	1,197	715	342	72	68
1961	1,401	874	361	85	81
1962	1,724	1,131	394	102	97
1963	1,965	1,311	425	121	108
1964	2,289	1,597	434	144	114
1965	2,555	1,809	461	164	121
1966	2,814	1,979	510	196	129
1967	3,039	2,184	492	223	140
1968	3,274	2,314	535	276	149
1969	3,425	2,425	540	298	162
1970	3,513	2,453	528	350	182
1971	3,577	2,434	547	400	196
1972	3,748	2,553	583	414	218
1973	3,877	2,640	605	408	224
1974	4,153	2,826	651	432	244
1975	4,556	3,087	705	479	285
1976	4,908	3,355	770	481	302
1977	5,476	3,760	853	527	336
1978	6,357	4,389	970	614	384
1979 (prelim) .	7,305	5,080	1,100	690	435
1980 (est.)	8,230	5,735	1,220	785	490

Constant 1972 dollars[1]

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	741	420	259	17	45
1960	1,733	1,031	499	104	99
1961	2,005	1,247	521	121	116
1962	2,429	1,591	558	143	137
1963	2,723	1,813	593	167	150
1964	3,125	2,177	596	196	156
1965	3,419	2,418	620	219	162
1966	3,660	2,572	665	255	168
1967	3,831	2,752	622	281	176
1968	3,975	2,810	649	335	181
1969	3,968	2,812	623	346	187
1970	3,860	2,697	578	385	200
1971	3,737	2,545	570	418	204
1972	3,748	2,553	563	414	218
1973	3,702	2,525	573	391	213
1974	3,661	2,500	563	384	214
1975	3,638	2,471	556	385	226
1976	3,680	2,516	577	361	226
1977	3,851	2,642	602	370	237
1978	4,182	2,887	638	404	253
1979 (prelim) .	4,420	3,074	665	418	263
1980 (est)	4,544	3,169	671	434	270

[1] Based on GNP implicit price deflator.

SOURCE: National Science Foundation.

Table 8. Basic research performance by sector: 1953 and 1960–80

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	441	101	151	110	33	46
1960	1,197	160	376	433	97	131
1961	1,401	206	395	536	115	149
1962	1,724	251	488	659	136	190
1963	1,965	255	522	814	159	215
1964	2,289	314	549	1,003	191	232
1965	2,555	364	592	1,138	208	253
1966	2,814	385	624	1,303	227	275
1967	3,039	418	629	1,457	250	285
1968	3,274	410	642	1,649	276	297
1969	3,425	516	618	1,711	275	305
1970	3,513	541	602	1,796	269	305
1971	3,577	491	590	1,914	260	322
1972	3,748	538	593	2,022	250	345
1973	3,877	537	631	2,055	297	357
1974	4,153	611	699	2,153	285	405
1975	4,556	682	730	2,410	309	425
1976	4,908	719	819	2,547	359	464
1977	5,476	866	911	2,787	402	510
1978	6,357	1,047	1,040	3,185	500	585
1979 (prelim) .	7,305	1,150	1,180	3,745	550	680
1980 (est)	8,230	1,210	1,325	4,275	650	770

Constant 1972 dollars[1]

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	741	169	256	184	55	77
1960	1,733	230	548	624	140	191
1961	2,005	293	570	763	164	215
1962	2,429	352	692	925	191	269
1963	2,723	352	729	1,122	219	301
1964	3,125	427	755	1,364	260	319
1965	3,419	486	796	1,519	278	340
1966	3,660	500	813	1,693	295	359
1967	3,831	526	796	1,834	315	360
1968	3,975	498	778	2.004	335	360
1969	3,968	599	713	1,985	319	352
1970	3,860	595	659	1,976	296	334
1971	3,737	514	615	2,001	272	335
1972	3,748	538	593	2,022	250	345
1973	3,702	514	597	1,969	285	337
1974	3,661	543	602	1,914	253	349
1975	3,638	547	574	1,935	248	334
1976	3,680	540	613	1,911	269	347
1977	3,851	608	643	1,958	282	360
1978	4,182	689	684	2,095	329	385
1979 (prelim) .	4,420	696	713	2,267	333	411
1980 (est)	4,544	669	729	2,363	359	424

[1] Based on GNP implicit price deflator.

SOURCE: National Science Foundation.

Table 9. Sources of funds used for applied research by sector: 1953 and 1960–80

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	1,279	747	455	57	20
1960	3,020	1,688	1,226	66	40
1961	3,065	1,754	1,195	69	47
1962	3,665	2,087	1,470	70	58
1963	3,742	2,125	1,483	72	62
1964	4,128	2,397	1,593	77	61
1965	4,339	2,524	1,654	88	73
1966	4,601	2,582	1,841	89	89
1967	4,803	2,717	1,889	102	95
1968	5,162	2,841	2,125	97	99
1969	5,342	2,811	2,320	105	106
1970	5,714	3,074	2,427	98	115
1971	5,845	3,114	2,494	115	122
1972	6,054	3,172	2,616	141	125
1973	6,680	3,474	2,892	174	140
1974	7,353	3,659	3,332	203	159
1975	7,950	4,027	3,517	224	182
1976	9,101	4,587	4,003	290	221
1977	9,893	4,917	4,426	307	243
1978	10,862	5,237	5,005	350	270
1979 (prelim) .	12,190	5,775	5,725	390	300
1980 (est)	13,505	6,295	6,440	440	330

Constant 1972 dollars[1]

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	2,160	1,258	773	95	34
1960	4,384	2,445	1,786	95	58
1961	4,404	2,513	1,725	98	68
1962	5,178	2,915	2,083	98	82
1963	5,208	2,952	2,071	99	86
1964	5,658	3,278	2,191	105	84
1965	5,823	3,383	2,225	117	98
1966	5,990	3,360	2,398	116	116
1967	6,068	3,429	2,391	128	120
1968	6,259	3,446	2,573	118	120
1969	6,174	3,254	2,676	122	122
1970	6,266	3,375	2,657	108	126
1971	6,097	3,252	2,598	120	127
1972	6,054	3,172	2,616	141	125
1973	6,347	3,314	2,733	167	133
1974	6,409	3,216	2,873	180	140
1975	6,300	3,210	2,765	180	145
1976	6,815	3,438	2,993	218	166
1977	6,971	3,455	3,124	216	176
1978	7,143	3,444	3,291	230	178
1979 (prelim) .	7,371	3,494	3,459	236	182
1980 (est)	7,443	3,474	3,544	243	182

[1] Based on GNP implicit price deflator.
SOURCE: National Science Foundation.

Table 10. Applied research performance by sector: 1953 and 1960–80

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	1,279	345	726	130	44	34
1960	3,020	595	2,029	179	122	95
1961	3,065	634	1,977	192	135	127
1962	3,665	702	2,449	205	155	154
1963	3,742	715	2,457	227	170	173
1964	4,128	903	2,600	232	202	191
1965	4,339	990	2,658	279	204	208
1966	4,601	997	2,843	328	207	226
1967	4,803	1,050	2,915	374	219	245
1968	5,162	1,141	3,124	404	231	262
1969	5,342	1,140	3,287	407	210	298
1970	5,714	1,321	3,427	427	216	323
1971	5,845	1,408	3,415	474	210	338
1972	6,054	1,405	3,514	544	226	365
1973	6,680	1,559	3,825	717	226	353
1974	7,353	1,698	4,288	737	217	413
1975	7,950	1,817	4,570	851	264	448
1976	9,101	2,149	5,112	1,015	327	498
1977	9,893	2,171	5,656	1,068	465	533
1978	10,862	2,170	6,390	1,195	517	590
1979 (prelim) .	12,190	2,380	7,230	1,330	540	710
1980 (est)	13,505	2,520	8,125	1,480	575	805

Constant 1972 dollars[1]

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	2,160	578	1,233	217	74	58
1960	4,384	856	2,955	258	176	139
1961	4,404	902	2,854	272	192	184
1962	5,178	984	3,471	287	217	219
1963	5,206	966	3,432	313	235	242
1964	5,658	1,228	3,576	316	275	263
1965	5,823	1,322	3,577	372	272	280
1966	5,990	1,296	3,704	427	269	294
1967	6,068	1,322	3,689	471	276	310
1968	6,259	1,387	3,783	491	281	317
1969	6,174	1,323	3,790	473	244	344
1970	6,266	1,453	3,751	470	238	354
1971	6,097	1,473	3,557	495	220	352
1972	6,054	1,405	3,514	544	226	365
1973	6,347	1,494	3,615	688	217	333
1974	6,409	1,509	3,696	655	193	356
1975	6,300	1,459	3,594	683	212	352
1976	6,815	1,613	3,823	762	245	372
1977	6,971	1,525	3,992	751	327	376
1978	7,143	1,427	4,203	785	340	388
1979 (prelim) .	7,371	1,441	4,369	805	327	429
1980 (est)	7,443	1,393	4,471	817	318	444

[1] Based on GNP implicit price deflator.
SOURCE: National Science Foundation

Table 11. Sources of funds used for development by sector: 1953 and 1960–80

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	3,404	1,755	1,637	5	7
1960	9,306	6,335	2,948	11	12
1961	9,850	6,622	3,201	11	16
1962	10,005	6,713	3,259	13	20
1963	11,352	7,768	3,548	14	22
1964	12,437	8,542	3,861	14	20
1965	13,150	8,679	4,433	15	23
1966	14,431	9,406	4,977	18	28
1967	15,304	9,494	5,761	20	29
1968	16,168	9,772	6,345	17	34
1969	16,864	9,659	7,150	17	38
1970	16,683	9,141	7,489	13	40
1971	17,182	9,344	7,781	14	43
1972	18,624	10,030	8,532	20	42
1973	20,074	10,195	9,797	33	49
1974	21,262	10,269	10,895	42	56
1975	22,750	11,038	11,598	47	67
1976	24,951	11,902	12,921	50	78
1977	27,644	13,074	14,417	59	94
1978	31,067	14,432	16,458	65	112
1979 (prelim)	34,801	15,907	18,695	70	129
1980 (est.)	38,640	17,370	21,050	75	145

Constant 1972 dollars[1]

Year	Total	Federal Government	Industry	Universities and colleges	Other nonprofit institutions
1953	5,765	2,965	2,780	8	12
1960	13,532	9,205	4,293	16	18
1961	14,191	9,532	4,620	16	23
1962	14,161	9,494	4,620	18	29
1963	15,830	10,824	4,956	19	31
1964	17,076	11,719	5,310	19	28
1965	17,672	11,656	5,965	20	31
1966	18,794	12,251	6,484	23	36
1967	19,353	12,001	7,291	25	36
1968	19,591	11,845	7,684	21	41
1969	19,464	11,155	8,245	20	44
1970	18,274	10,018	8,198	14	44
1971	17,905	9,743	8,103	15	44
1972	18,624	10,030	8,532	20	42
1973	19,014	9,674	9,261	32	47
1974	18,406	8,931	9,390	37	48
1975	17,950	8,736	9,123	38	53
1976	18,670	8,911	9,664	38	57
1977	19,494	9,217	10,174	41	62
1978	20,431	9,491	10,825	43	72
1979 (prelim)	21,032	9,617	11,296	42	77
1980 (est.)	21,277	9,572	11,584	41	80

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[1] Based on GNP implicit price deflator.

SOURCE: National Science Foundation.

Table 12. Development performance by sector: 1953 and 1960–80

[Dollars in millions]

Current dollars

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	3,404	564	2,753	15	44	28
1960	9,306	971	8,104	34	141	56
1961	9,850	1,034	8,536	35	160	85
1962	10,005	1,145	8,527	40	179	114
1963	11,352	1,309	9,651	40	201	151
1964	12,437	1,621	10,363	40	236	177
1965	13,150	1,739	10,935	57	217	202
1966	14,431	1,838	12,081	84	196	232
1967	15,304	1,928	12,841	90	204	241
1968	16,168	1,942	13,663	96	212	255
1969	16,864	1,847	14,403	107	240	267
1970	16,683	1,993	14,038	112	252	288
1971	17,182	2,257	14,315	112	246	252
1972	18,624	2,539	15,445	110	288	242
1973	20,074	2,523	16,793	168	294	296
1974	21,262	2,506	17,900	133	363	360
1975	22,750	2,898	18,887	148	414	403
1976	24,951	2,842	21,066	168	461	414
1977	27,644	3,105	23,361	209	517	452
1978	31,067	3,665	25,970	235	700	497
1979 (prelim.)	34,801	3,970	29,212	265	750	604
1980 (est.)	38,640	4,100	32,800	295	800	670

Constant 1972 dollars[1]

Year	Total	Federal Government	Industry	Universities and colleges	Associated FFRDC's	Other nonprofit institutions
1953	5,765	944	4,675	25	74	47
1960	13,532	1,397	11,801	49	203	82
1961	14,191	1,470	12,321	50	228	122
1962	14,161	1,606	12,086	56	251	162
1963	15,830	1,806	13,481	55	277	211
1964	17,076	2,204	14,252	55	321	244
1965	17,672	2,321	14,713	76	290	272
1966	18,794	2,389	15,739	109	255	302
1967	19,353	2,428	16,250	113	257	305
1968	19,591	2,360	16,547	118	258	308
1969	19,464	2,144	16,608	125	279	308
1970	18,274	2,192	15,367	122	277	316
1971	17,905	2,361	14,908	117	257	262
1972	18,624	2,539	15,445	110	288	242
1973	19,014	2,417	15,873	162	282	280
1974	18,406	2,228	15,428	117	323	310
1975	17,950	2,326	14,854	120	332	318
1976	18,670	2,133	15,754	127	346	310
1977	19,494	2,181	16,485	146	363	319
1978	20,431	2,411	17,078	155	460	327
1979 (prelim.)	21,032	2,403	17,650	160	454	365
1980 (est.)	21,277	2,267	18,500	163	428	369

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[1] Based on GNP implicit price deflator.

SOURCE: National Science Foundation

Table 13. Trends in Federal and non-Federal R&D outlays: 1953 and 1960–80

[Percents]

Year	Federal				Non-Federal
	Total	Defense related	Space related	Civilian related	
1953	54	48	1	5	46
1960	65	52	3	9	35
1961	65	50	6	9	35
1962	64	48	7	10	36
1963	66	41	14	10	34
1964	66	37	19	11	34
1965	65	33	21	11	35
1966	64	33	19	12	36
1967	62	35	14	13	38
1968	61	35	13	13	39
1969	58	34	11	13	42
1970	57	33	10	14	43
1971	56	32	9	15	44
1972	55	32	8	15	45
1973	53	31	7	15	47
1974	51	28	7	16	49
1975	51	27	7	17	49
1976	51	26	8	17	49
1977	51	25	8	18	49
1978	50	24	7	19	50
1979 (prelim.)	49	24	7	18	51
1980 (est.)	49	24	8	17	51

NOTE: Detail may not add to 100 because of rounding.
SOURCE: National Science Foundation.

Table 14. Full-time-equivalent (FTE) scientists and engineers employed in research and development by sector: selected years[1]

[In thousands]

Sector	1954	1961	1965	1969	1972	1973	1974	1975	1976	1977	1978	1979[2]	1980[2]
Total	237.1	425.7	494.5	555.2	518.3	518.4	525.1	534.9	549.2	573.9	601.6	629.5	659.0
Federal Government[3]	37.7	51.1	61.8	68.5	64.4	61.8	62.6	63.4	64.0	64.7	65.4	66.0	66.5
Industry[4, 5]	164.1	312.0	348.4	385.6	353.9	358.8	361.6	363.6	373.6	393.2	415.6	440.0	465.0
Universities and colleges, total	25.0	42.4	53.4	68.3	66.5	63.5	65.5	70.2	71.8	74.5	77.7	80.0	82.5
Scientists and engineers	20.3	33.6	40.4	50.4	48.9	46.9	48.0	51.6	52.9	54.4	57.1	59.0	60.5
Graduate students[6]	4.7	8.8	13.0	17.9	17.6	16.6	17.5	18.6	18.9	20.1	20.6	21.0	22.0
University-associated FFRDC's, total	5.0	9.1	11.1	11.6	11.7	12.0	12.1	12.7	13.4	14.0	14.7	15.0	16.0
Scientists and engineers	4.9	8.8	10.7	11.1	11.3	11.7	11.8	12.3	13.0	13.6	14.3	14.6	15.6
Graduate students[6]	.1	.3	.4	.5	.4	.3	.3	.4	.4	.4	.4	.4	.4
Other nonprofit institutions[4]	5.3	11.1	19.9	21.2	21.8	22.3	23.3	24.8	26.4	27.5	28.0	28.5	29.0

[1] Number of full-time employees plus the FTE of part-time employees. Excludes scientists and engineers employed in State and local government agencies. Totals may be understated by about 5 percent because of incomplete data on summer employment at universities and colleges.

[2] Estimate.

[3] Includes both civilian and military service personnel and managers of R&D.

[4] Includes professional R&D personnel employed at FFRDC's administered by organizations in the sector.

[5] Excludes social scientists.

[6] Numbers of FTE graduate students receiving stipends and engaged in R&D.

NOTE: The figures for the industry sector represent yearly averages and may differ from other data in the text which is based upon surveys reporting the employment in a single month of the year.

SOURCE: National Science Foundation

Table 15. National expenditures for performance of R&D as a percent of gross national product (GNP) by source: 1961–80

Year	Total	Federal	Nonfederal
1961	2.74	1.77	.97
1962	2.73	1.76	.97
1963	2.87	1.88	.99
1964	2.97	1.97	1.00
1965	2.91	1.89	1.02
1966	2.90	1.86	1.04
1967	2.91	1.81	1.10
1968	2.83	1.72	1.11
1969	2.74	1.59	1.15
1970	2.64	1.49	1.15
1971	2.50	1.40	1.10
1972	2.43	1.35	1.08
1973	2.34	1.25	1.09
1974	2.32	1.19	1.13
1975	2.31	1.19	1.12
1976	2.29	1.17	1.12
1977	2.26	1.15	1.11
1978	2.27	1.13	1.14
1979 (prelim)	2.29	1.13	1.16
1980 (est)	2.30	1.12	1.18

SOURCE: National Science Foundation and Department of Commerce

Table 16. R&D scientists and engineers and employed civilian labor force: selected years

[In thousands]

Year	R&D scientists and engineers	Employed civilian labor force
1967	530.0	74,372
1969	555.2	77,902
1971	526.6	79,120
1973	518.4	84,409
1975	534.9	84,783
1977	573.9	90,546
1979 (est)	629.5	96,945
1980 (est)	659.0	97,800

SOURCE: National Science Foundation and Department of Labor

Table 17. National expenditures for performance of R&D as a percent of gross national product (GNP) by country: 1967–78

Year	France	West Germany	Japan	United Kingdom	United States	U.S.S.R.
1967	2.13	1.97	1.53	2.33	2.91	2.91
1968	2.08	1.97	1.61	2.29	2.83	NA
1969	1.94	2.05	1.65	2.23	2.74	3.03
1970	1.91	2.18	1.79	NA	2.64	3.23
1971	1.90	2.38	1.84	NA	2.50	3.29
1972	1.86	2.33	1.85	2.06	2.43	3.58
1973	1.77	2.22	1.89	NA	2.34	3.66
1974	1.81	2.26	1.95	NA	2.32	3.64
1975	1.82	2.39	1.94	2.05	2.31	3.69
1976	1.78	2.28	1.93	NA	2.29	3.55
1977	1.79	2.26	1.92	NA	2.26	3.47
1978	NA	2.28	1.93	NA	2.27	NA

NA = Not available.

SOURCE: National Science Foundation, Organization for Economic Cooperation and Development, and Dr. Robert Campbell (Indiana University)

Table 18. Scientists and engineers[1] engaged in R&D per 10,000 labor force population by country: 1967–78

Year	France	West Germany	Japan	United Kingdom	United States	U.S.S.R.	
						Low estimate	High estimate
1967	25.3	24.9	27.8	NA	66.1	50.7	55.3
1968	26.4	26.2	31.1	17.2	66.9	53.5	58.8
1969	27.2	28.4	30.8	NA	65.9	56.5	62.1
1970	27.3	30.9	33.4	NA	63.9	58.4	64.2
1971	27.8	33.8	37.5	NA	60.6	63.0	69.1
1972	28.1	36.0	38.1	27.8	58.2	66.5	73.2
1973	28.4	37.8	42.5	NA	56.9	73.5	81.5
1974	28.8	39.1	44.9	NA	56.3	74.5	82.9
1975	29.3	41.0	47.9	30.6	56.4	78.2	87.5
1976	29.9	41.7	48.4	NA	56.7	80.7	80.9
1977	30.3	44.3	49.9	NA	57.7	81.9	92.7
1978	NA	NA	49.4	NA	58.7	NA	NA

[1] Includes all scientists and engineers engaged in R&D on a full-time-equivalent basis (except Japan whose data include persons primarily employed in R&D and the United Kingdom whose data include only the government and industry sectors).

NA = Not available.

SOURCE: National Science Foundation, U.S. Department of Labor, Organisation for Economic Cooperation and Development, and Dr. Robert Campbell (Indiana University).

Table 19. Estimated ratio of civilian R&D expenditures[1] to gross national product (GNP) for selected countries: 1967–76

Year	France	West Germany	Japan	United Kingdom	United States
1967	1.50	1.70	1.51	1.68	1.48
1968	1.54	1.72	1.60	1.70	1.47
1969	1.49	1.81	1.64	1.69	1.51
1970	1.47	1.96	NA	NA	1.50
1971	1.37	2.16	NA	NA	1.48
1972	1.39	2.13	NA	1.49	1.46
1973	1.30	2.01	NA	NA	1.45
1974	1.34	2.27	1.91	NA	1.51
1975	1.41	2.20	NA	1.50	1.52
1976	1.42	2.09	NA	NA	1.57

[1] National R&D expenditures, excluding government funds for defense and space.

NA = Not available.

SOURCE: National Science Foundation and Organization for Economic Cooperation and Development

TABLE 20. FEDERAL OUTLAYS FOR RESEARCH, DEVELOPMENT, AND R&D PLANT BY AGENCY: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

AGENCY	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES	
									1979	1980
TOTAL, ALL AGENCIES ..	15,973,223	16,728,893	17,489,068	18,302,221	19,557,945	21,030,633	23,390,611	25,704,978	29,005,062	31,072,346
DEPT OF AGRICULTURE ..	318,891	357,859	357,068	381,452	425,641	468,843	537,766	572,359	647,018	640,276
DEPT OF COMMERCE	122,875	168,209	186,193	188,202	224,592	233,316	238,188	272,678	303,754	327,378
DEPT OF DEFENSE	7,705,984	8,297,162	8,597,649	8,979,742	9,363,517	9,445,510	10,307,977	10,935,419	12,271,412	13,462,507
ARMY	1,670,589	1,889,811	2,042,439	2,308,602	2,083,044	1,969,575	2,195,044	2,464,318	2,629,058	2,942,431
NAVY	2,477,856	2,501,480	2,498,936	2,715,822	3,126,263	3,320,098	3,582,569	3,919,368	4,328,527	4,546,467
AIR FORCE	3,025,587	3,426,186	3,588,512	3,442,302	3,567,555	3,625,220	3,902,173	3,969,911	4,574,933	5,131,080
DEFENSE AGENCIES .	527,458	475,705	461,310	485,162	556,858	507,500	610,460	555,057	713,494	808,729
OTHER DOD	4,494	3,980	6,452	27,854	29,797	23,117	17,731	26,765	25,400	33,800
DEPT OF ENERGY 1/.....	1,604,948	1,551,266	1,624,370	1,824,987	2,246,625	2,553,700	3,593,121	4,413,005	5,286,214	5,525,268
DEPT OF HLTH, EDUC, & WELFARE	1,326,809	1,554,467	1,878,385	1,960,576	2,168,201	2,615,030	2,622,223	3,070,235	3,303,575	3,657,689
NIH	946,041	1,112,067	1,373,688	1,435,422	1,684,363	2,118,384	2,104,983	2,507,105	2,683,854	2,965,247
OTHER HEW	380,768	442,400	504,697	525,154	483,838	496,646	517,240	563,130	619,721	692,442
DEPT OF THE INTERIOR .	185,060	214,531	254,136	199,564	272,686	329,077	314,900	365,310	422,448	404,173
DEPT OF TRANSPORTATION	477,754	287,029	337,287	363,738	339,191	335,700	363,504	377,250	402,420	390,200
ENVIRONMENTAL PROTECTION AGENCY ..	101,014	133,821	147,668	172,242	218,567	265,620	282,950	312,514	376,204	403,550
NAT'L AERONAUTICS & SPACE ADMIN	3,381,907	3,422,862	3,315,163	3,256,216	3,266,491	3,669,022	3,945,311	3,983,119	4,404,100	4,595,000
NATIONAL SCIENCE FOUNDATION	373,925	435,000	470,941	584,711	600,400	669,100	674,700	738,566	808,800	878,000
ALL OTHER AGENCIES ...	374,056	306,687	320,208	390,791	432,034	445,715	509,971	664,523	779,117	788,305

1/ DATA FOR FY 1971 - 1974 AND FY 1975 - 1976 REFLECT OBLIGATIONS TO ATOMIC ENERGY COMMISSION AND ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION, RESPECTIVELY.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 21. FEDERAL OBLIGATIONS FOR RESEARCH AND DEVELOPMENT BY AGENCY: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

AGENCY	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES	
									1979	1980
TOTAL, ALL AGENCIES ..	15,545,004	16,497,776	16,800,099	17,414,658	19,047,077	20,788,933	2[illegible],994,968	26,414,263	29,575,953	30,732,944
DEPT OF AGRICULTURE ..	304,902	349,573	366,522	378,706	420,082	462,449	546,963	621,282	666,922	663,661
DEPT OF COMMERCE	143,711	187,259	190,600	180,585	215,382	228,853	244,721	283,665	319,125	321,898
DEPT OF DEFENSE	7,509,036	8,318,145	8,404,214	8,420,386	9,012,472	9,654,722	10,963,351	11,553,638	13,001,485	13,879,748
ARMY	1,682,350	2,064,179	2,013,569	2,009,862	1,896,742	2,013,653	2,441,866	2,548,927	2,775,647	3,044,831
NAVY	2,283,674	2,519,364	2,654,754	2,718,520	3,100,165	3,328,005	3,817,410	3,998,416	4,618,232	4,527,868
AIR FORCE	3,113,500	3,254,278	3,273,543	3,216,215	3,513,495	3,726,627	4,031,095	4,262,349	4,679,120	5,220,929
DEFENSE AGENCIES .	426,485	476,362	434,081	448,881	476,537	561,647	641,441	707,886	898,686	1,045,070
OTHER DOD	3,027	3,962	28,267	26,908	25,533	24,790	31,539	36,060	29,800	41,050
DEPT OF ENERGY 1/.....	1,302,926	1,297,668	1,363,196	1,488,903	2,047,306	2,463,809	3,536,220	4,244,827	4,688,453	4,658,810
DEPT OF HLTH, EDUC, & WELFARE	1,476,071	1,751,112	1,837,578	2,290,114	2,397,458	2,583,563	2,823,297	3,207,254	3,665,427	3,725,834
NIH	1,039,000	1,271,300	1,314,198	1,736,784	1,879,872	2,060,247	2,279,859	2,580,862	2,960,602	2,961,440
OTHER HEW	437,071	479,812	523,380	553,330	517,586	523,316	543,438	626,392	704,825	764,394
DEPT OF THE INTERIOR .	193,731	220,333	243,418	196,581	311,171	342,028	326,142	385,235	434,987	417,257
DEPT OF TRANSPORTATION	497,204	310,505	310,640	369,789	311,563	294,500	354,604	408,250	418,220	395,100
ENVIRONMENTAL PROTECTION AGENCY ..	136,718	122,350	180,592	169,213	257,657	259,138	295,450	384,636	400,352	435,641
NAT'L AERONAUTICS & SPACE ADMIN	3,257,927	3,157,237	3,060,887	3,002,172	3,064,413	3,446,830	3,703,385	3,875,414	4,392,300	4,539,958
NATIONAL SCIENCE FOUNDATION	336,942	454,840	479,893	556,413	595,021	609,256	697,019	748,775	818,919	910,085
ALL OTHER AGENCIES ...	385,836	328,754	362,559	361,796	414,552	443,785	503,816	701,287	769,763	784,952

1/ DATA FOR FY 1971 - 1974 AND FY 1975 - 1976 REFLECT OBLIGATIONS TO ATOMIC ENERGY COMMISSION AND ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION, RESPECTIVELY.

SOURCE: NATIONAL SCIENCE FOUNDATION

Table 21a. Federal R&D funding by budget function:[1] fiscal years 1971–80

(Dollars in millions)

	Actual								Estimates	
	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Total	15,545	16,498	16,800	17,415	19,047	20,789	23,995	26,512	29,475	30,664
National defense	8,110	8,902	9,002	9,016	9,679	10,430	11,864	12,899	14,284	15,117
Space research and technology	3,048	2,932	2,824	2,702	2,764	3,130	3,365	3,481	3,944	4,051
Health	1,288	1,547	1,585	2,069	2,170	2,352	2,629	2,968	3,387	3,444
Energy	556	574	630	759	1,363	1,649	2,562	3,134	3,485	3,429
General science	513	625	658	749	813	858	974	1,050	1,128	1,248
Natural resources and environment	418	480	554	520	632	692	765	898	994	1,054
Transportation	728	559	572	694	635	631	709	768	823	863
Agriculture	259	294	308	313	342	383	457	501	555	559
Education, training, employment, and social services	215	235	290	236	239	255	230	345	347	352
Veterans benefits and services	63	69	74	85	95	98	107	111	123	123
International affairs	32	29	28	24	29	42	66	57	78	103
Community and regional development	65	66	78	82	93	109	101	92	114	95
Commerce and housing credit	90	50	50	51	65	69	71	77	92	89
Administration of justice	10	23	33	35	44	35	30	44	46	49
Income security	145	106	106	71	72	48	55	67	57	71
General government	7	8	7	9	12	12	13	18	18	20

[1] Listed in descending order of 1980 budget authority. Data for 1971–77 are shown in obligations; data for 1978–80 are shown in budget authority.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation.

TABLE 22. FEDERAL OBLIGATIONS FOR RESEARCH AND DEVELOPMENT BY CHARACTER OF WORK: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

FISCAL YEAR	TOTAL	RESEARCH		DEVELOPMENT
		BASIC	APPLIED	
1971	15,545,004	1,956,592	3,294,396	10,294,016
1972	16,497,776	2,178,629	3,413,763	10,905,384
1973	16,800,099	2,210,584	3,435,420	11,154,095
1974	17,414,658	2,364,523	3,855,485	11,194,650
1975	19,047,077	2,590,795	4,258,350	12,197,932
1976	20,788,933	2,759,241	4,865,144	13,164,548
1977	23,994,968	3,256,399	5,358,763	15,379,806
1978	26,414,263	3,699,124	6,051,761	16,663,378
1979 (ESTIMATES)	29,575,953	4,205,133	6,684,055	18,686,765
1980 (ESTIMATES)	30,732,944	4,537,606	7,055,703	19,139,635

NOTE: DATA FOR 1979 AND 1980 TAKEN FROM FEDERAL FUNDS FOR RESEARCH AND DEVELOPMENT, FISCAL YEARS 1978, 1979, AND 1980, VOLUME XXVIII, WHICH WAS BASED ON THE PRESIDENT'S 1980 BUDGET.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 23. FEDERAL OBLIGATIONS FOR RESEARCH AND DEVELOPMENT BY PERFORMER: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

PERFORMER	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	ESTIMATES 1980
TOTAL	15,545,004	16,497,776	16,800,099	17,414,658	19,047,077	20,788,933	23,994,968	26,414,263	29,575,953	30,732,944
FEDERAL INTRAMURAL 1/.	4,207,205	4,543,734	4,708,734	4,865,300	5,318,208	5,696,782	6,064,681	6,882,033	7,521,493	7,747,419
INDUSTRIAL FIRMS 2/...	8,087,891	8,293,854	8,367,234	8,391,969	9,171,566	10,246,756	12,297,952	13,128,330	14,905,710	15,535,808
UNIVERSITIES AND COLLEGES	1,644,159	1,902,164	1,915,544	2,214,508	2,408,374	2,541,537	2,905,439	3,364,796	3,864,320	4,047,608
FFRDC'S ADMIN BY UNIVS AND COLLEGES	728,867	760,559	725,310	789,136	935,076	1,061,115	1,326,809	1,325,629	1,411,417	1,499,669
OTHER NONPROFIT INSTITUTIONS 2/	672,769	731,149	762,028	874,323	924,639	938,479	1,073,848	1,321,897	1,468,499	1,486,559
ALL OTHER PERFORMERS .	204,113	266,316	321,249	279,422	289,194	304,264	326,239	391,578	404,514	415,881

1/ FEDERAL INTRAMURAL ACTIVITIES COVER COSTS ASSOCIATED WITH THE ADMINISTRATION OF INTRAMURAL AND EXTRAMURAL PROGRAMS BY FEDERAL PERSONNEL AS WELL AS ACTUAL INTRAMURAL PERFORMANCE.

2/ INCLUDES FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS (FFRDC'S) ADMINISTERED BY THIS SECTOR.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 24. FEDERAL OBLIGATIONS FOR RESEARCH BY AGENCY: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

AGENCY	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	ESTIMATES 1980
TOTAL, ALL AGENCIES ..	5,250,988	5,592,392	5,646,004	6,220,008	6,849,145	7,624,385	8,615,162	9,750,885	10,889,188	11,593,309
DEPT OF AGRICULTURE ..	292,152	337,169	354,106	365,064	401,944	442,224	524,020	594,484	637,513	635,751
DEPT OF COMMERCE	113,674	143,394	130,155	129,189	144,420	155,713	176,129	192,775	216,199	228,193
DEPT OF DEFENSE	1,434,588	1,547,369	1,500,708	1,474,646	1,542,185	1,523,259	1,804,897	1,941,213	2,152,731	2,412,545
ARMY	339,126	350,964	361,949	348,741	335,668	306,425	433,415	414,300	435,528	502,755
NAVY	273,150	303,190	284,098	292,938	302,730	314,900	377,967	402,000	445,100	448,100
AIR FORCE	498,819	508,900	522,996	508,036	571,485	557,100	598,800	685,727	740,930	805,600
DEFENSE AGENCIES .	320,466	380,353	328,474	322,239	330,634	344,134	393,415	431,686	525,973	645,190
OTHER DOD	3,027	3,962	3,191	2,692	1,668	700	1,300	7,500	5,200	10,900
DEPT OF ENERGY 1/.....	428,991	417,122	424,784	464,746	593,431	746,499	891,266	1,102,243	1,183,188	1,267,947
DEPT OF HLTH, EDUC, & WELFARE	1,231,919	1,432,028	1,444,199	1,846,692	1,924,830	2,150,733	2,414,2[illegible]	2,740,717	3,141,524	3,217,409
NIH	913,489	1,099,350	1,132,050	1,489,640	1,604,217	1,767,692	1,968,658	2,232,596	2,561,802	2,566,940
OTHER HEW	318,430	332,678	312,149	357,052	320,613	383,041	445,622	508,121	579,722	650,469
DEPT OF THE INTERIOR .	139,071	148,924	159,833	147,652	241,895	268,288	267,402	309,753	374,683	369,390
DEPT OF TRANSPORTATION	97,000	98,183	77,236	61,781	53,844	31,100	51,760	66,500	77,300	67,300
ENVIRONMENTAL PROTECTION AGENCY ..	53,818	51,068	74,287	96,294	141,711	155,395	205,252	252,670	267,254	314,303
NAT'L AERONAUTICS & SPACE ADMIN	922,688	764,592	793,920	845,667	935,139	1,222,841	1,206,076	1,345,167	1,495,102	1,636,992
NATIONAL SCIENCE FOUNDATION	318,286	427,270	463,953	520,256	570,015	595,776	688,300	743,502	811,069	901,085
ALL OTHER AGENCIES ...	218,801	225,273	222,823	268,019	299,731	332,557	385,780	461,861	532,625	542,394

1/ DATA FOR FY 1971 - 1974 AND FY 1975 - 1976 REFLECT OBLIGATIONS TO ATOMIC ENERGY COMMISSION AND ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION, RESPECTIVELY.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 25. FEDERAL OBLIGATIONS FOR RESEARCH BY PERFORMER: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

PERFORMER	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	ESTIMATES 1980
TOTAL	5,250,988	5,592,392	5,646,004	6,220,008	6,849,145	7,624,385	8,615,162	9,750,885	10,889,188	11,593,309
FEDERAL INTRAMURAL 1/.	1,897,290	1,939,928	2,056,575	2,224,833	2,446,829	2,791,442	2,940,363	3,216,914	3,546,045	3,714,155
INDUSTRIAL FIRMS 2/...	1,079,123	1,069,334	1,050,645	1,058,241	1,274,024	1,369,712	1,666,002	2,027,914	2,299,439	2,569,351
UNIVERSITIES AND COLLEGES	1,430,902	1,642,145	1,690,569	1,959,962	2,083,112	2,253,210	2,589,263	2,932,560	3,340,514	3,487,344
FFRDC'S ADMIN BY UNIVS AND COLLEGES	358,906	398,441	355,166	373,966	425,512	548,278	670,304	714,850	751,855	837,517
OTHER NONPROFIT INSTITUTIONS 2/..........	337,284	404,251	368,722	467,937	463,457	491,985	573,722	659,896	735,022	747,423
ALL OTHER PERFORMERS .	147,483	138,293	124,327	135,069	156,211	169,758	175,508	198,751	216,313	237,519

1/ FEDERAL INTRAMURAL ACTIVITIES COVER COSTS ASSOCIATED WITH THE ADMINISTRATION OF INTRAMURAL AND EXTRAMURAL PROGRAMS BY FEDERAL PERSONNEL AS WELL AS ACTUAL INTRAMURAL PERFORMANCE.

2/ INCLUDES FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS (FFRDC'S) ADMINISTERED BY THIS SECTOR.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 26. FEDERAL OBLIGATIONS FOR RESEARCH BY FIELD OF SCIENCE: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

FIELD OF SCIENCE	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	ESTIMATES 1980
TOTAL	5,250,988	5,592,392	5,646,004	6,220,008	6,849,145	7,624,385	8,615,162	9,750,885	10,889,188	11,593,309
LIFE SCIENCES	1,594,785	1,842,315	1,928,840	2,265,196	2,462,099	2,639,396	3,016,038	3,430,134	3,896,464	3,992,956
PSYCHOLOGY	107,845	120,997	107,620	132,855	137,580	138,229	156,086	192,527	208,032	228,791
PHYSICAL SCIENCES	918,326	1,005,802	986,883	1,028,980	1,120,001	1,267,859	1,560,663	1,683,397	1,846,921	2,063,632
ENVIRONMENTAL SCIENCES	536,478	567,034	583,836	635,786	737,023	772,330	918,514	1,050,245	1,180,003	1,288,505
MATHEMATICS & COMPUTER SCIENCES	127,340	145,958	133,494	136,652	151,729	167,660	210,946	235,552	275,579	315,519
ENGINEERING	1,570,097	1,460,031	1,412,728	1,575,088	1,765,455	2,067,737	2,124,718	2,445,914	2,659,016	2,795,016
SOCIAL SCIENCES	303,604	305,693	297,825	291,176	302,198	392,755	448,689	506,876	560,310	575,425
OTHER SCIENCES, NEC ..	92,513	144,562	194,778	154,275	173,060	178,419	179,508	206,240	262,863	333,465

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 27. FEDERAL OBLIGATIONS FOR BASIC RESEARCH BY AGENCY: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

AGENCY	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	ESTIMATES 1980
TOTAL, ALL AGENCIES ..	1,956,592	2,178,629	2,210,584	2,364,523	2,590,795	2,759,241	3,256,399	3,699,124	4,205,133	4,537,606
DEPT OF AGRICULTURE ..	118,414	137,311	142,726	145,611	154,184	171,371	204,450	242,704	251,872	267,551
DEPT OF COMMERCE	41,777	44,024	16,313	18,189	20,065	22,274	23,159	23,861	26,626	28,842
DEPT OF DEFENSE	261,545	270,336	257,844	243,892	235,515	248,440	294,826	319,079	378,429	436,894
ARMY	46,509	55,784	44,673	48,006	37,281	39,040	58,552	54,530	59,882	73,610
NAVY	85,778	92,600	83,631	83,250	88,117	95,900	115,328	130,300	151,800	152,800
AIR FORCE	84,719	86,600	92,296	77,736	79,385	81,600	85,300	95,100	104,900	122,184
DEFENSE AGENCIES .	44,539	35,352	37,244	34,900	30,732	31,900	35,646	39,149	61,847	88,300
DEPT OF ENERGY 1/.....	276,897	268,289	275,156	269,504	312,758	345,790	389,450	440,534	471,645	548,442
DEPT OF HLTH, EDUC, & WELFARE	574,523	665,362	667,348	850,065	903,747	986,172	1,119,495	1,292,339	1,561,380	1,581,476
NIH	503,707	585,700	592,966	775,300	828,520	920,312	1,032,776	1,181,094	1,428,600	1,434,500
OTHER HEW	70,816	79,662	74,382	74,765	75,227	65,860	86,719	111,245	132,780	146,976
DEPT OF THE INTERIOR .	52,690	57,086	66,517	74,066	109,906	113,289	128,909	145,672	165,404	161,359
DEPT OF TRANSPORTATION	341	535	166	275	75	-	-	-	-	-
ENVIRONMENTAL PROTECTION AGENCY ..	6,100	6,118	9,030	9,500	17,400	13,700	8,296	6,010	9,424	16,883
NAT'L AERONAUTICS & SPACE ADMIN	327,301	331,611	350,279	305,857	309,335	293,209	413,774	479,729	531,192	599,176
NATIONAL SCIENCE FOUNDATION	272,566	367,691	392,442	415,217	485,989	523,634	624,900	678,040	741,078	828,315
ALL OTHER AGENCIES ...	24,438	30,266	32,763	32,347	41,821	41,362	49,140	71,156	68,083	68,668

1/ DATA FOR FY 1971 - 1974 AND FY 1975 - 1976 REFLECT OBLIGATIONS TO ATOMIC ENERGY COMMISSION AND ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION, RESPECTIVELY.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 28. FEDERAL OBLIGATIONS FOR BASIC RESEARCH BY PERFORMER: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

PERFORMER	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	 1980
TOTAL	1,956,592	2,178,629	2,210,584	2,364,523	2,590,795	2,759,241	3,256,399	3,699,124	4,205,133	4,537,606
FEDERAL INTRAMURAL 1/.	555,353	598,275	603,493	687,876	753,318	794,023	929,378	1,046,603	1,156,543	1,202,528
INDUSTRIAL FIRMS 2/...	188,567	175,876	209,144	148,403	157,248	182,180	252,395	303,203	348,810	414,551
UNIVERSITIES AND COLLEGES	872,921	1,017,676	1,039,392	1,138,012	1,253,299	1,336,585	1,546,984	1,754,525	2,049,997	2,200,265
FFRDC'S ADMIN BY UNIVS AND COLLEGES	227,724	254,485	228,984	223,098	257,548	284,884	324,119	356,772	381,906	442,102
OTHER NONPROFIT INSTITUTIONS 2/..........	86,154	103,248	100,237	131,982	141,045	132,028	167,523	196,347	218,535	228,415
ALL OTHER PERFORMERS .	25,873	29,069	29,344	35,152	28,337	29,541	36,000	41,674	49,342	49,745

1/ FEDERAL INTRAMURAL ACTIVITIES COVER COSTS ASSOCIATED WITH THE ADMINISTRATION OF INTRAMURAL AND EXTRAMURAL PROGRAMS BY FEDERAL PERSONNEL AS WELL AS ACTUAL INTRAMURAL PERFORMANCE.

2/ INCLUDES FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS (FFRDC'S) ADMINISTERED BY THIS SECTOR.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 29. FEDERAL OBLIGATIONS FOR BASIC RESEARCH BY FIELD OF SCIENCE: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

FIELD OF SCIENCE	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	 1980
TOTAL	1,956,592	2,178,629	2,210,584	2,364,523	2,590,795	2,759,241	3,256,399	3,699,124	4,205,133	4,537,606
LIFE SCIENCES	744,782	865,619	874,704	1,021,573	1,104,029	1,206,255	1,372,140	1,572,399	1,840,961	1,904,042
PSYCHOLOGY	45,361	56,829	45,785	47,890	58,591	42,652	53,518	80,443	89,576	94,248
PHYSICAL SCIENCES	577,507	619,847	613,449	634,946	694,350	713,523	868,067	922,408	1,031,423	1,168,528
ENVIRONMENTAL SCIENCES	279,654	290,994	299,225	320,407	339,457	354,628	456,111	527,867	578,400	633,842
MATHEMATICS & COMPUTER SCIENCES	51,919	63,260	57,203	48,931	58,300	69,907	79,404	92,231	105,797	121,278
ENGINEERING	171,420	186,514	205,863	191,787	236,857	242,862	306,242	344,181	385,977	422,897
SOCIAL SCIENCES	70,218	79,988	78,769	73,285	73,688	86,294	95,411	124,198	130,628	132,642
OTHER SCIENCES, NEC ..	15,731	15,578	35,586	25,704	25,523	43,120	25,506	35,397	42,371	60,129

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 30. FEDERAL OBLIGATIONS FOR APPLIED RESEARCH BY AGENCY: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

AGENCY	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	ESTIMATES 1980
TOTAL, ALL AGENCIES ..	3,294,396	3,413,763	3,435,420	3,855,485	4,258,350	4,865,144	5,358,763	6,051,761	6,684,055	7,055,703
DEPT OF AGRICULTURE ..	173,738	199,858	211,380	219,453	247,760	270,853	319,570	351,780	385,641	368,200
DEPT OF COMMERCE	71,897	99,370	113,842	111,000	124,355	133,439	152,970	168,914	189,573	199,351
DEPT OF DEFENSE	1,173,043	1,277,033	1,242,864	1,230,754	1,306,670	1,274,819	1,510,071	1,622,134	1,774,302	1,975,651
ARMY	292,617	295,180	317,276	300,735	298,387	267,385	374,863	359,770	375,646	429,145
NAVY	187,372	210,590	200,467	209,688	214,613	219,000	262,639	271,700	293,300	295,300
AIR FORCE	414,100	422,300	430,700	430,300	492,100	475,500	513,500	590,627	636,030	683,416
DEFENSE AGENCIES .	275,927	345,001	291,230	287,339	299,902	312,234	357,769	392,537	464,126	556,890
OTHER DOD	3,027	3,962	3,191	2,692	1,668	700	1,300	7,500	5,200	10,900
DEPT OF ENERGY 1/.....	152,094	148,833	149,628	195,244	280,673	400,709	501,816	661,709	711,543	719,505
DEPT OF HLTH, EDUC, & WELFARE	657,396	766,666	776,851	996,627	1,021,083	1,164,561	1,294,785	1,448,378	1,580,144	1,635,933
NIH	409,782	513,650	539,084	714,340	775,697	847,380	935,882	1,051,502	1,133,202	1,132,440
OTHER HEW	247,614	253,016	237,767	282,287	245,386	317,181	358,903	396,876	446,942	503,493
DEPT OF THE INTERIOR .	86,381	91,838	93,316	73,586	131,989	154,999	138,493	164,081	209,279	208,031
DEPT OF TRANSPORTATION	96,659	97,648	77,070	61,506	53,769	31,100	51,760	66,500	77,300	67,300
ENVIRONMENTAL PROTECTION AGENCY ..	47,718	44,950	65,257	86,794	124,311	141,695	196,956	246,660	257,830	297,420
NAT'L AERONAUTICS & SPACE ADMIN	595,387	432,981	443,641	539,810	625,804	929,632	792,302	865,438	963,910	1,037,816
NATIONAL SCIENCE FOUNDATION	45,720	59,579	71,511	105,039	84,026	72,142	63,400	65,462	69,991	72,770
ALL OTHER AGENCIES ...	194,363	195,007	190,060	235,672	257,910	291,195	336,640	390,705	464,542	473,726

1/ DATA FOR FY 1971 - 1974 AND FY 1975 - 1976 REFLECT OBLIGATIONS TO ATOMIC ENERGY COMMISSION AND ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION, RESPECTIVELY.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 31. FEDERAL OBLIGATIONS FOR APPLIED RESEARCH BY PERFORMER: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

PERFORMER	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	ESTIMATES 1980
TOTAL	3,294,396	3,413,763	3,435,420	3,855,485	4,258,350	4,865,144	5,358,763	6,051,761	6,684,055	7,055,703
FEDERAL INTRAMURAL 1/.	1,341,937	1,341,653	1,453,092	1,536,957	1,693,511	1,997,419	2,010,985	2,170,311	2,389,502	2,511,627
INDUSTRIAL FIRMS 2/...	890,556	893,458	841,501	909,838	1,116,776	1,187,532	1,413,607	1,724,711	1,950,629	2,154,800
UNIVERSITIES AND COLLEGES	557,981	624,469	651,177	821,950	829,813	916,625	1,042,279	1,178,035	1,290,517	1,287,079
FFRDC'S ADMIN BY UNIVS AND COLLEGES	131,182	143,956	126,182	150,868	167,964	263,394	346,185	358,078	369,949	395,415
OTHER NONPROFIT INSTITUTIONS 2/...........	251,130	301,003	268,485	335,955	322,412	359,957	406,199	463,549	516,487	519,008
ALL OTHER PERFORMERS .	121,610	109,224	94,983	99,917	127,874	140,217	139,508	157,077	166,971	187,774

1/ FEDERAL INTRAMURAL ACTIVITIES COVER COSTS ASSOCIATED WITH THE ADMINISTRATION OF INTRAMURAL AND EXTRAMURAL PROGRAMS BY FEDERAL PERSONNEL AS WELL AS ACTUAL INTRAMURAL PERFORMANCE.

2/ INCLUDES FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS (FFRDC'S) ADMINISTERED BY THIS SECTOR.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 32. FEDERAL OBLIGATIONS FOR APPLIED RESEARCH BY FIELD OF SCIENCE: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

FIELD OF SCIENCE	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	ESTIMATES 1980
TOTAL	3,294,396	3,413,763	3,435,420	3,855,485	4,258,350	4,865,144	5,358,763	6,051,761	6,684,055	7,055,703
LIFE SCIENCES	850,003	976,696	1,054,136	1,243,623	1,358,070	1,433,141	1,643,898	1,857,735	2,055,503	2,088,914
PSYCHOLOGY	62,484	64,168	61,835	84,965	78,989	95,577	102,568	112,084	118,456	134,543
PHYSICAL SCIENCES	340,819	385,955	373,434	394,034	425,651	554,336	692,596	760,989	815,498	895,104
ENVIRONMENTAL SCIENCES	256,824	276,040	284,611	315,379	397,566	417,702	462,403	522,378	601,603	654,663
MATHEMATICS & COMPUTER SCIENCES	75,421	82,698	76,291	87,721	93,429	97,753	131,542	143,321	169,782	194,241
ENGINEERING	1,398,677	1,273,517	1,206,865	1,383,301	1,528,598	1,824,875	1,818,476	2,101,733	2,273,039	2,372,119
SOCIAL SCIENCES	233,386	225,705	219,056	217,891	228,510	306,461	353,278	382,678	429,682	442,783
OTHER SCIENCES, NEC ..	76,782	128,984	159,192	128,571	147,537	135,299	154,002	170,843	220,492	273,336

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 33. FEDERAL OBLIGATIONS FOR DEVELOPMENT BY AGENCY: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

AGENCY	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	ESTIMATES 1980
TOTAL, ALL AGENCIES ..	10,294,016	10,905,384	11,154,095	11,194,650	12,197,932	13,164,548	15,379,806	16,663,378	18,686,765	19,139,635
DEPT OF AGRICULTURE ..	12,750	12,404	12,416	13,642	18,138	20,225	22,943	26,798	29,409	27,910
DEPT OF COMMERCE	30,037	43,865	60,445	51,396	70,962	73,140	68,592	90,890	102,926	93,705
DEPT OF DEFENSE	6,074,448	6,770,776	6,903,506	6,945,740	7,470,287	8,131,463	9,158,454	9,612,425	10,848,754	11,467,203
ARMY	1,343,224	1,713,215	1,651,620	1,661,121	1,561,074	1,707,228	2,008,451	2,134,627	2,340,119	2,542,076
NAVY	2,010,524	2,216,174	2,370,656	2,425,582	2,797,435	3,013,105	3,439,443	3,596,416	4,173,132	4,079,768
AIR FORCE	2,614,681	2,745,378	2,750,547	2,708,179	2,942,010	3,169,527	3,432,295	3,576,622	3,938,190	4,415,329
DEFENSE AGENCIES .	106,019	96,009	105,607	125,642	145,903	217,513	248,026	276,200	372,713	399,880
OTHER DOD	-	-	25,076	24,216	23,865	24,090	30,239	28,560	24,600	30,150
DEPT OF ENERGY 1/.....	873,935	880,546	938,412	1,024,155	1,453,875	1,717,310	2,644,954	3,142,584	3,505,265	3,390,863
DEPT OF HLTH, EDUC, & WELFARE	244,152	319,084	393,379	443,422	472,628	432,830	409,017	466,537	523,903	508,425
NIH	125,511	171,950	182,148	247,144	275,655	292,555	311,201	348,266	398,800	394,500
OTHER HEW	118,641	147,134	211,231	196,278	196,973	140,275	97,816	118,271	125,103	113,925
DEPT OF THE INTERIOR .	54,660	71,409	83,585	48,929	69,276	73,740	58,740	75,482	60,304	47,867
DEPT OF TRANSPORTATION	400,204	212,322	233,404	308,008	257,719	263,400	302,844	341,750	340,920	327,800
ENVIRONMENTAL PROTECTION AGENCY ..	82,900	71,282	106,305	72,919	115,946	103,743	90,198	131,966	133,098	121,338
NAT'L AERONAUTICS & SPACE ADMIN	2,335,239	2,392,645	2,266,967	2,156,505	2,129,274	2,223,989	2,497,309	2,530,247	2,897,198	2,902,966
NATIONAL SCIENCE FOUNDATION	18,656	27,570	15,940	36,157	25,006	13,480	8,719	5,273	7,850	9,000
ALL OTHER AGENCIES ...	167,035	103,481	139,736	93,777	114,821	111,228	118,036	239,426	237,138	242,558

1/ DATA FOR FY 1971 - 1974 AND FY 1975 - 1976 REFLECT OBLIGATIONS TO ATOMIC ENERGY COMMISSION AND ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION, RESPECTIVELY.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 34. FEDERAL OBLIGATIONS FOR DEVELOPMENT BY PERFORMER: FISCAL YEARS 1971 - 1980

(THOUSANDS OF DOLLARS)

PERFORMER	1971	1972	1973	1974	1975	1976	1977	1978	ESTIMATES 1979	 1980
TOTAL	10,294,016	10,905,384	11,154,095	11,194,650	12,197,932	13,164,548	15,379,806	16,663,378	18,686,765	19,139,635
FEDERAL INTRAMURAL 1/.	2,309,915	2,603,806	2,652,159	2,640,467	2,871,379	2,905,340	3,124,318	3,665,119	3,975,448	4,033,264
INDUSTRIAL FIRMS 2/...	7,008,768	7,224,520	7,316,589	7,333,728	7,897,562	8,877,044	10,631,950	11,100,416	12,606,271	12,966,457
UNIVERSITIES AND COLLEGES	213,257	260,019	224,975	254,546	325,262	288,327	316,176	432,236	523,806	560,264
FFRDC'S ADMIN BY UNIVS AND COLLEGES	369,961	362,118	370,144	415,170	509,564	512,837	656,505	610,779	659,562	662,152
OTHER NONPROFIT INSTITUTIONS 2/..........	335,485	326,898	393,306	406,386	461,182	446,494	500,126	662,001	733,477	739,136
ALL OTHER PERFORMERS .	56,630	128,023	196,922	144,353	132,983	134,506	150,731	192,827	188,201	178,362

1/ FEDERAL INTRAMURAL ACTIVITIES COVER COSTS ASSOCIATED WITH THE ADMINISTRATION OF INTRAMURAL AND EXTRAMURAL PROGRAMS BY FEDERAL PERSONNEL AS WELL AS ACTUAL INTRAMURAL PERFORMANCE.

2/ INCLUDES FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS (FFRDC'S) ADMINISTERED BY THIS SECTOR.

SOURCE: NATIONAL SCIENCE FOUNDATION

Table 35. R&D scientists and engineers employed in the Federal Government by broad field categories: selected years

	1967	1969	1971	1973	1975	1977
Total[1]	65,500	68,500	67,200	61,800	63,400	64,700
Civilian total	52,500	54,500	55,200	53,700	55,700	57,400
Scientists	27,300	28,300	27,700	27,000	28,000	28,900
Physical and environmental scientists	16,000	16,600	15,300	14,900	15,300	15,500
Life scientists	5,900	6,100	6,300	6,200	6,400	6,900
Mathematicians and statisticians ...	3,100	3,200	3,500	3,400	3,600	3,700
Social scientists[2]	1,500	1,600	1,500	1,500	1,600	1,600
Psychologists	800	800	1,100	1,000	1,100	1,200
Engineers	25,300	26,300	27,500	26,800	27,700	28,500

[1] Includes R&D administrators, R&D grant and contract administrators, and S/E personnel directly engaged in R&D activities; also included are uniformed military S/E personnel, the bulk of whom are assumed to be engaged in R&D activities. Data are calculated on a full-time-equivalent basis.

[2] Includes the fields of economics, sociology, anthropology, political science, linguistics, education, geography, cartography, and community planning.

NOTE: Detail may not add to totals because of rounding.

SOURCE: National Science Foundation based on data of the Office of Personnel Management.

Table 36. Funds for industrial R&D performance by source: 1968–79

[Dollars in millions]

Year	Total R&D		Federal			Company		
	Current dollars	Constant 1972 dollars[1]	Current dollars	Constant 1972 dollars[1]	Percent of total	Current dollars	Constant 1972 dollars[1]	Percent of total
1968	17,429	21,108	8,560	10,366	49	8,869	10,741	51
1969	18,308	21,112	8,451	9,745	46	9,867	11,368	54
1970	18,062	19,770	7,779	8,514	43	10,283	11,255	57
1971	18,311	19,070	7,666	7,984	42	10,645	11,086	58
1972	19,539	19,539	8,017	8,017	41	11,522	11,522	59
1973	21,233	20,069	8,145	7,698	38	13,088	12,371	62
1974	22,867	19,710	8,220	7,084	36	14,647	12,624	64
1975	24,164	19,000	8,605	6,768	36	15,559	12,227	64
1976	26,938	20,139	9,561	7,148	35	17,377	12,991	65
1977	29,933	21,123	10,525	7,427	35	19,408	13,697	65
1978	33,406	21,970	11,301	7,432	34	22,105	14,538	66
1979 (est.)	37,700	22,765	12,550	7,579	33	25,150	15,200	67

[1] Based on the GNP implicit price deflator.

SOURCE: National Science Foundation

Table 37. Funds for industrial R&D performance by industry: 1968-78

(Dollars in millions)

Industry	SIC code	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Total	....	17,429	18,308	18,067	18,320	19,552	21,249	22,887	24,187	26,997	29,933	33,406
Food and kindred products	20	184	199	230	240	259	269	298	335	355	398	431
Textiles and apparel	22,23	58	60	58	59	61	64	69	70	82	82	87
Lumber, wood products, and furniture	24,25	20	18	52	53	64	71	84	88	107	127	138
Paper and allied products	26	144	188	178	187	189	194	237	249	313	337	394
Chemicals and allied products	28	1,589	1,660	1,773	1,832	1,932	2,116	2,450	2,727	3,017	3,261	3,594
Industrial chemicals	281-82,286	965	1,007	1,031	1,009	1,031	1,119	1,299	1,391	1,524	1,446	1,570
Drugs and medicines	283	398	444	485	549	607	698	807	981	1,091	1,157	1,281
Other chemicals	284-85,287-89	226	209	257	274	294	299	344	354	401	658	743
Petroleum and refining	29	437	467	515	505	468	498	622	693	767	920	1,071
Rubber products	30	223	261	276	289	377	426	469	467	502	488	504
Stone, clay, and glass products	32	142	159	167	164	183	199	217	233	263	287	331
Primary metals	33	251	257	275	272	277	307	358	443	506	531	546
Ferrous metals and products	331-32,3396,[illegible]399	135	136	149	144	146	163	181	215	256	260	264
Nonferrous metals and products	333-36	115	121	126	128	130	145	177	228	250	271	282
Fabricated metal products	34	183	182	207	242	253	291	313	324	358	393	397
Machinery	35	1,483	1,546	1,729	1,860	2,158	2,549	2,985	3,196	3,487	3,952	4,459
Office, computing, and accounting machines	357	(1)	(1)	(1)	(1)	1,456	1,733	2,103	2,220	2,402	2,783	3,126
Other machinery except electrical	35 (Balance)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	1,189	1,333
Electrical equipment	36	4,083	4,347	4,220	4,389	4,680	4,902	5,011	5,105	5,636	5,928	6,743
Radio and TV receiving equipment	365	56	57	70	64	48	49	51	50	52	61	54
Electronic components	367	} 2,520	2,670	2,604	2,731	{ 330	408	489	549	691	746	834
Communication equipment	366					2,563	2,613	2,424	2,385	2,511	2,804	3,252
Other electrical equipment	361-64,369	1,508	1,620	1,546	1,594	1,719	1,834	2,047	2,121	2,382	2,317	2,603
Motor vehicles and motor vehicles equipment	371	} 1,499	1,568	1,591	1,768	{ 1,954	2,405	2,389	2,340	2,778	3,324	3,783
Other transportation equipment	373-75,379					56	72	87	90	94	121	131
Aircraft and missiles	372,376	5,765	5,878	5,219	4,881	4,950	5,052	5,278	5,713	6,339	7,089	7,680
Professional and scientific instruments	38	663	742	744	746	838	961	1,075	1,173	1,331	1,466	1,689
Scientific and mechanical measuring instruments	381,82	118	123	131	133	163	186	221	266	[illegible]	373	452
Optical, surgical, photographic, and other instruments	383-87	545	619	613	612	675	775	854	907	1,007	1,093	1,237
Other manufacturing industries	21,27,31,39	101	121	128	131	146	158	177	205	217	250	280
Nonmanufacturing industries	07-17,41-67,737 739,807,891	603	655	705	704	707	715	768	735	845	978	1,152

[1] Data not tabulated at this level prior to 1972.

[2] Data not tabulated at this level prior to 1977.

SOURCE: National Science Foundation

Table 38. Federal funds for industrial R&D performance by industry: 1968-78

Industry	SIC code	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Total		8,869	8,451	7,779	7,666	8,017	8,145	8,220	8,605	9,561	10,525	11,301
Food and kindred products	20	182	1	3	2	1	1	1	(1)	(1)	(1)	(1)
Textiles and apparel	22,23	(1)	(1)	(1)	1	1	1	(1)	(1)	(1)	(1)	(1)
Lumber, wood products, and furniture	24,25	20	0	0	(1)	(1)	(1)	(1)	0	0	0	0
Paper and allied products	26	(1)	(1)	(1)	(1)	2	(1)	(1)	(1)	(1)	(1)	(1)
Chemicals and allied products	28	1,389	192	180	184	189	203	214	236	266	299	361
Industrial chemicals	281-82,286	810	165	152	159	171	183	194	218	249	277	338
Drugs and medicines	283	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other chemicals	284-85,287-89	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Petroleum refining	29	403	10	22	17	15	14	20	(1)	52	76	119
Rubber products	30	186	65	71	69	123	146	(1)	(1)	(1)	(1)	(1)
Stone, clay, and glass products	32	139	1	11	10	14	15	14	(1)	(1)	(1)	(1)
Primary metals	33	241	10	10	6	12	11	8	21	26	24	28
Ferrous metals and products	134	2		1	2	3	4	(1)	3	4	4	5
Nonferrous metals and products	333-36	108	9	9	4	10	7	(1)	17	22	20	23
Fabricated metal products	34	165	8	7	11	12	13	14	27	36	45	36
Machinery	35	1,142	260	262	315	401	429	511	509	532	569	582
Office, computing, and accounting machines	357	(2)	(2)	(2)	(2)	(1)	(1)	(1)	486	509	546	552
Other machinery, except electrical	35 Balance	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	23	30
Electrical equipment	36	1,749	2,390	2,211	2,258	2,367	2,410	2,307	2,307	2,555	2,693	2,976
Radio and TV receiving equipment	365	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	0	0	0
Electronic components	367	993	1,557	1,420	1,479	125	146	184	(1)	(1)	(1)	(1)
Communication equipment	366					1,417	1,362	1;137	1,057	1,093	1,202	1,372
Other electrical equipment	361-64,369	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	1,124	290	314	309	293	385	268	318	383	438	449
Other transportation equipment	373-75,379					28	39	47	47	(1)	(1)	(1)
Aircraft and missiles	372,376	1,230	4,524	4,005	3,864	3,970	3,899	4,000	4,428	4,921	5,526	5,821
Professional and scientific instruments	38	429	237	194	164	161	160	167	172	163	159	174
Scientific and mechanical measuring instruments	381,82	83	32	20	14	13	11	10	15	15	10	10
Optical, surgical, photographic, and other instruments	383-87	346	205	174	150	148	149	157	157	148	149	164
Other manufacturing industries	21,27,31,39	(1)	(1)	(1)	(1)	(1)	(1)	(1)	7	5	5	9
Nonmanufacturing industries	07-17,41-67,737 739,807,891	172	448	480	452	431	416	463	310	375	466	547

[1] Not separately available but included in total.
[2] Data not tabulated at this level prior to 1972.
[3] Data not tabulated at this level prior to 1977.
SOURCE: National Science Foundation

Table 39. Company funds for industrial R&D performance by industry: 1968-78

(Dollars in millions)

Industry	SIC code	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Total	....	8,560	9,857	10,288	10,654	11,535	13,104	14,667	15,582	17,436	19,408	22,105
Food and kindred products	20	2	198	227	238	258	268	297	(1)	(1)	(1)	(1)
Textiles and apparel	22,23	(1)	(1)	(1)	59	61	63	(1)	(1)	(1)	(1)	(1)
Lumber, wood products, and furniture	24,25	0	18	52	(1)	(1)	(1)	(1)	88	106	127	136
Paper and allied products	26	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Chemicals and allied products	28	199	1,468	1,593	1,648	1,741	1,913	2,236	2,490	2,751	2,962	3,233
Industrial chemicals	281-82,286	171	842	873	850	860	936	1,105	1,173	1,275	1,169	1,232
Drugs and medicines	283	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other chemicals	284-85,287-89	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Petroleum refining	29	34	457	493	488	454	485	603	(1)	715	844	952
Rubber products	30	37	196	205	221	255	280	(1)	(1)	(1)	(1)	(1)
Stone, clay, and glass products	32	3	158	156	153	168	184	203	(1)	(1)	(1)	(1)
Primary metals	33	9	247	265	266	264	297	350	422	481	507	518
Ferrous metals and products	331-32,3398,3399	1	135	148	142	144	159	(1)	211	252	256	259
Nonferrous metals and products	333-36	8	112	117	124	121	138	(1)	211	229	251	259
Fabricated metal products	34	18	174	201	230	243	279	299	297	322	348	361
Machinery	35	340	1,286	1,469	1,545	1,758	2,120	2,473	2,687	2,955	3,383	3,876
Office, computing, and accounting machines	357	(2)	(2)	(2)	(2)	(1)	(1)	(1)	1,734	1,893	2,217	2,574
Other machinery, except electrical	35 (Balance)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	1,166	1,302
Electrical equipment	36	2,333	1,957	2,008	2,131	2,313	2,491	2,704	2,798	3,081	3,238	3,769
Radio and TV receiving equipment	365	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	52	61	54
Electronic components	367	1,326	1,113	1,183	1,252	205	260	306	(1)	(1)	(1)	(1)
Communication equipment	366					1,165	1,251	1,287	1,328	1,418	1,602	1,880
Other electrical equipment	361-64,369	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	374	1,278	1,278	1,461	1,661	2,020	2,101	2,022	2,395	2,886	3,334
Other transportation equipment	373-75,379					29	33	40	43	(1)	(1)	(1)
Aircraft and missiles	372,376	4,533	1,354	1,213	1,017	978	1,154	1,278	1,265	1,418	1,563	1,859
Professional and scientific instruments	38	234	505	550	583	678	801	908	1,001	1,168	1,307	1,515
Scientific and mechanical measuring instruments	381,82	35	91	111	120	151	175	211	251	309	363	442
Optical, surgical, photographic, and other instruments	383-87	199	414	439	463	527	626	697	750	859	944	1,073
Other manufacturing industries	21,27,31,39	(1)	(1)	(1)	(1)	(1)	(1)	(1)	198	212	245	271
Nonmanufacturing industries	07-17,41-67,737 739,807,891	431	207	225	252	277	299	305	425	471	512	605

[1] Not separately available but included in total.

[2] Data not tabulated at this level prior to 1972.

[3] Data not tabulated at this level prior to 1977.

SOURCE: National Science Foundation

Table 40. R&D funds as percent of net sales in R&D-performing manufacturing companies by industry: 1968-78

Industry	SIC code	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Total	....	4.0	4.0	3.7	3.5	3.4	3.3	3.1	3.1	3.1	3.1	3.0
Food and kindred products	20	.5	.4	.5	.5	.4	.4	.4	.4	.4	.4	.5
Textiles and apparel	22,23	.5	.8	.5	.5	.4	.4	.4	.4	.4	.4	.4
Lumber, wood products, and furniture	24,25	.4	.4	.8	.7	.8	.7	.8	.7	.7	.8	.7
Paper and allied products	26	.9	1.0	.9	.9	.8	.7	.8	.9	1.0	.9	1.0
Chemicals and allied products	28	3.8	3.9	3.9	3.7	3.6	3.5	3.5	3.7	3.7	3.7	3.6
Industrial chemicals	281-82,286	4.0	4.0	4.2	3.9	3.9	3.6	3.3	3.6	3.7	3.6	3.5
Drugs and medicines	283	6.0	6.0	6.7	6.2	6.5	6.5	6.3	6.4	6.3	6.4	6.3
Other chemicals	284-85,287-89	2.1	2.0	1.8	1.9	1.7	1.6	1.6	1.7	1.7	2.1	2.2
Petroleum refining	29	.8	.9	1.0	.9	.8	.7	.6	.7	.6	.7	.7
Rubber products	30	2.1	2.2	2.3	2.2	2.6	2.6	2.5	2.5	2.4	2.1	1.9
Stone, clay, and glass products	32	1.6	1.7	1.8	1.8	1.7	1.7	1.7	1.2	1.2	1.2	1.3
Primary metals	33	.8	.8	.8	.8	.7	.7	.6	.8	.8	.7	.6
Ferrous metals and products	331-32,3398,3399	.7	.7	.7	.7	.6	.5	.5	.6	.6	.5	.5
Nonferrous metals and products	333-36	1.0	1.0	1.0	1.0	.9	.9	1.0	1.2	1.2	1.0	.9
Fabricated metal products	34	1.3	1.2	1.2	1.2	1.1	1.2	1.2	1.2	1.2	1.2	1.1
Machinery	35	4.0	3.8	4.0	4.0	4.3	4.6	4.6	4.8	4.9	5.0	5.0
Office, computing, and accounting machines	357	(1)	(1)	(1)	(1)	11.1	11.6	12.6	12.0	11.6	11.9	11.7
Other machinery, except electrical	35 (Balance)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	2.2	2.1
Electrical equipment	36	8.4	7.9	7.3	7.2	7.1	6.9	6.6	6.5	6.7	6.2	6.2
Radio and TV receiving equipment	365	2.2	2.2	2.7	2.4	1.6	1.7	1.7	1.4	1.4	1.4	1.1
Electronic components	367	10.9	9.7	8.2	8.2	5.9	6.2	6.2	6.9	7.3	6.9	6.6
Communication equipment	366					8.7	8.1	7.6	7.6	7.6	7.5	7.7
Other electrical equipment	361-64,369	6.8	6.6	6.6	6.4	6.3	6.3	6.3	6.0	6.3	5.3	5.3
Motor vehicles and motor vehicles equipment	371	3.1	3.1	3.5	3.1	3.3	3.5	3.7	3.5	3.2	3.1	3.2
Other transportation equipment	373-75,379					1.0	1.2	1.3	1.3	1.3	1.5	1.4
Aircraft and missiles	372,376	19.0	20.2	18.2	16.2	16.6	13.3	14.1	12.7	12.7	12.7	12.4
Professional and scientific instruments	38	6.5	6.4	5.7	5.7	5.9	6.1	6.1	5.9	6.2	6.0	6.0
Scientific and mechanical measuring instruments	381,82	4.1	3.8	3.5	3.7	4.1	4.3	4.5	4.9	5.4	5.7	5.8
Optical, surgical, photographic, and other instruments	383-87	7.4	7.4	6.6	6.4	6.6	6.8	6.7	6.3	6.4	6.1	6.1
Other manufacturing industries	21,27,31,39	.8	.8	.8	.8	.8	.8	.9	.8	.7	.7	.6

[1] Data not tabulated at this level prior to 1972.

[2] Data not tabulated at this level prior to 1977.

SOURCE: National Science Foundation

Table 41. Company R&D funds as percent of net sales in R&D-performing manufacturing companies by industry: 1968-78

Industry	SIC code	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978
Total	....	2.1	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Food and kindred products	20	0.5	0.4	0.5	0.5	0.4	0.4	0.4	(1)	(1)	(1)	(1)
Textiles and apparel	22,23	(1)	(1)	(1)	0.5	0.4	0.4	(1)	(1)	(1)	(1)	(1)
Lumber, wood products, and furniture	24,25	0.4	0.3	0.8	(1)	(1)	(1)	(1)	0.7	0.7	0.8	0.7
Paper and allied products	26	(1)	(1)	(1)	(1)	0.8	(1)	(1)	(1)	(1)	(1)	(1)
Chemicals and allied products	28	3.4	3.4	3.5	3.3	3.3	3.1	3.0	3.1	3.3	3.4	3.2
Industrial chemicals	281-82,286	3.3	3.4	3.6	3.3	3.2	3.0	2.8	3.1	3.1	2.9	2.7
Drugs and medicines	283	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Other chemicals	284-85,287-89	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Petroleum refining	29	0.8	0.9	0.9	0.8	0.7	0.7	0.5	(1)	0.6	0.6	0.6
Rubber products	30	1.8	1.6	1.7	1.7	1.7	1.7	(1)	(1)	(1)	(1)	(1)
Stone, clay, and glass products	32	1.6	1.7	1.7	1.6	1.6	1.5	1.5	(1)	(1)	(1)	(1)
Primary metals	33	0.8	0.8	0.8	0.8	0.7	0.6	0.5	0.7	0.8	0.7	0.6
Ferrous metals and products	331-32,3398,3399	0.7	0.7	0.7	0.7	0.6	0.5	(1)	0.6	0.6	0.5	0.5
Nonferrous metals and products	333-36	0.9	0.9	0.9	1.0	0.9	0.8	(1)	1.1	1.1	0.9	0.8
Fabricated metal products	34	1.2	1.2	1.1	1.1	1.1	1.2	1.1	1.1	1.1	1.1	1.0
Machinery	3.1	3.2		3.4	3.3	3.5	3.8	3.8	4.0	4.2	4.3	4.5
Office, computing, and accounting machines	357	(2)	(2)	(2)	(2)	(1)	(1)	(1)	9.4	9.1	9.4	9.6
Other machinery, except electrical	Balance of 35	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	2.1	2.1
Electrical equipment	36	3.6	3.5	3.4	3.5	3.5	3.5	3.5	3.6	3.7	3.4	3.5
Radio and TV receiving equipment	365	(1)	(1)	(1)	(1)	(1)	(1)	(1)	1.4	1.4	1.4	1.1
Electronic components	367	4.3	4.0	3.7	3.8	3.7	3.9	3.9	(1)	(1)	(1)	(1)
Communication equipment	366					3.9	3.9	3.9	4.2	4.3	4.3	4.5
Other electrical equipment	361-64,369	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	2.4	2.6	2.8	2.5	2.8	2.9	3.2	3.0	2.7	2.7	2.8
Other transportation equipment	373-75,379					0.6	0.6	0.6	0.6	0.6	(1)	(1)
Aircraft and missiles	372,376	4.1	4.6	3.8	3.4	3.3	3.0	3.5	2.8	2.8	2.8	3.0
Professional and scientific instruments	38	4.2	4.4	4.2	4.5	4.8	5.1	5.2	5.1	5.4	5.3	5.4
Scientific and mechanical measuring instruments	381,82	2.9	2.8	2.9	3.3	3.8	4.0	4.4	4.7	5.3	5.5	5.7
Optical, surgical, photographic, and other instruments	383-87	4.7	5.0	4.7	4.9	5.1	5.5	5.5	5.2	5.5	5.3	5.1
Other manufacturing industries	21,27,31,39	(1)	0.7	0.8	(1)	(1)	(1)	(1)	0.7	0.7	0.7	0.6

[1] Not separately available but included in total.

[2] Data not tabulated at this level prior to 1972.

[3] Data not tabulated at this level prior to 1977.

SOURCE: National Science Foundation

Table 42. Funds for the performance of industrial basic research by industry: 1968-77

(Dollars in millions)

Industry	SIC code	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Total	....	842	618	602	590	593	31	699	729	817	910
Food and kindred products	20	16	16	16	25	13	11	9	10	17	19
Textiles and apparel	22,23	2	2	2	2	2	1	2	(1)	(1)	(1)
Lumber, wood products, and furniture	24,25	(1)	(1)	(1)	(1)	(1)	(1)	(1)	3	5	7
Paper and allied products	26	4	4	5	4	4	5	7	5	6	9
Chemicals and allied products	28	202	208	207	216	214	236	288	294	304	336
Industrial chemicals	281-82	(1)	(1)	(1)	110	107	111	129	14	133	142
Drugs and medicines	283	60	67	93	77	78	90	107	112	119	131
Other chemicals	284-89	16	20	25	29	29	35	52	47	53	63
Petroleum refining and extraction	29,13	37	38	26	21	22	26	33	36	44	48
Rubber products	30	6	8	5	4	6	3	5	4	7	9
Stone, clay, and glass products	32	(1)	(1)	(1)	14	18	20	21	32	38	41
Primary metals	33	14	16	18	17	9	8	9	14	16	15
Ferrous metals and products	331-32,3398,3399	(1)	(1)	(1)	(1)	(1)	(1)	(1)	4	5	5
Nonferrous metals and products	333-36	5	8	8	(1)	(1)	(1)	(1)	10	12	10
Fabricated metal products	34	3	3	5	(1)	7	11	3	5	2	2
Machinery	35	31	21	21	22	24	24	28	32	56	59
Office, computing, and accounting machines	357	(3)	(3)	(1)	(1)	(1)	(1)	(1)	26	38	43
Other machinery except electrical		(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	16
Electrical equipment and communication	36,48	134	133	139	138	137	143	143	142	163	181
Radio and TV receiving equipment	365	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Electronic components	367	115	117	122	120	10	8	5	4	5	6
Communication equipment and communication	366,48					108	117	116	119	130	146
Other electrical equipment	361-64,369	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Motor vehicles and motor vehicles equipment	371	(1)	(1)	(1)	21	10	8	9	10	8	12
Other transportation equipment	373-75,379					(1)	(1)	(1)	(1)	(1)	(1)
Aircraft and missiles	372,376	70	65	63	50	62	56	57	54	54	56
Professional and scientific instruments	38	(1)	(1)	(1)	19	17	15	18	16	22	22
Scientific and mechanical measuring instruments	381-82	(1)	(1)	(1)	7	6	5	5	9	10	10
Optical, surgical, photographic, and other instruments	383-87	(1)	(1)	(1)	12	11	10	11	8	11	12
Other manufacturing industries	21,27,31,39	5	5	4	6	5	6	6	(1)	(1)	(1)
Nonmanufacturing industries	07-12,14-17,41-47, 49-67,737,739, 807,891	45	43	38	31	28	28	26	25	29	41

[1] Not separately available but included in total.

[2] Data not tabulated at this level prior to 1972.

[3] Data not tabulated at this level prior to 1977.

SOURCE: National Science Foundation

Table 43. Funds for the performance of industrial basic research by field of science: 1968–77

[Dollars in millions]

	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Total	642	618	602	590	593	631	699	729	817	910
Physical sciences	317	324	297	281	277	276	319	320	359	405
Chemistry	191	213	196	180	183	193	229	228	253	285
Physics	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Astronomy	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Mathematics	13	13	13	14	12	14	13	14	18	19
Environmental sciences	11	11	8	8	6	7	10	15	17	19
Atmospheric sciences	(1)	(1)	(1)	3	(1)	2	3	6	6	5
Geological sciences	(1)	(1)	(1)	3	4	3	5	5	7	7
Oceanography	(1)	(1)	(1)	2	(1)	1	1	3	4	7
Engineering (including metallurgy)	181	170	170	159	183	185	178	191	204	233
Life sciences	76	74	86	94	82	102	119	122	134	156
Biological sciences	50	58	51	57	61	77	83	85	102	128
Clinical medical sciences	26	16	35	37	21	25	36	37	32	28
Other sciences	43	26	28	34	33	47	60	67	85	78

[1] Not separately available but included in total.

SOURCE: National Science Foundation

Table 44. Funds for the performance of industrial applied research: 1971–79

[Millions of constant 1972 dollars][1]

Year	Funds	Percent change
1971	3,554	N.A.
1972	3,512	−1.2
1973	3,613	+2.9
1974	3,692	+2.2
1975	3,599	−2.5
1976	3,815	+6.0
1977	3,994	+4.7
1978	4,203	+5.2
1979 (est.)	4,378	+4.2

[1] Based on the GNP implicit price deflator.

SOURCE: National Science Foundation

Table 45. Funds for the performance of applied research and development by product field: 1968–77

[Dollars in millions]

Product field	SIC Code	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Total		16,787	17,700	17,460	17,731	18,946	20,602	22,168	23,435	26,121	29,023
Atomic energy devices		(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Ordnance and accessories, n.e.c.	348	201	186	192	192	177	228	222	187	199	288
Guided missiles and spacecraft	376	3,786	3,711	3,115	2,832	2,647	2,491	2,486	2,925	2,880	3,035
Food and kindred products	20	165	179	204	207	227	243	283	273	308	350
Textile mill products	22	58	66	55	60	83	93	82	73	81	96
Chemicals, except drugs and medicines	28, except 283	1,168	1,214	1,339	1,345	1,250	1,342	1,564	1,627	1,853	2,024
Industrial inorganic and organic chemicals	281	382	390	398	398	371	383	445	494	548	620
Plastics materials and synthetic resins, rubber, and fibers	282	466	482	521	511	453	511	589	588	674	747
Agricultural chemicals	287	99	104	126	130	108	114	137	176	205	236
Other chemicals	284-86	221	237	267	277	318	335	392	369	426	422
Drugs and medicines	283	375	417	474	535	531	605	683	783	883	959
Petroleum refining and extraction	29,13	239	252	272	266	299	319	363	408	425	473
Rubber and miscellaneous plastics products	30	160	163	193	215	279	294	341	324	325	378
Stone, clay, and glass products	32	130	157	128	128	135	162	181	150	171	191
Primary metals	33	207	224	235	230	245	272	311	290	311	327
Ferrous metals and products	331,332,3398,3399	119	125	127	114	137	158	156	144	163	172
Nonferrous metals and products	333-36	88	99	108	116	108	114	155	147	148	155
Fabricated metal products	34	478	504	622	701	731	769	903	916	1,025	1,157
Machinery	35	1,396	1,562	1,676	1,783	1,989	2,307	2,689	2,628	3,001	3,572
Engines and turbines	351	203	196	204	246	316	360	482	464	477	531
Farm machinery and equipment	352	96	99	89	90	93	120	131	138	168	222
Construction, mining, and materials handling	353	129	154	182	196	206	265	283	285	317	378
Metalworking machinery and equipment	354	90	83	86	84	76	69	74	80	83	126
Office, computing, and accounting machines	357	678	812	863	903	1,028	1,219	1,422	1,339	1,580	1,856
Other machinery, except electrical	balance of 35	201	218	252	264	270	274	297	322	376	458
Electrical equipment, except communication	36 except 365-67 and 3825	3,383	3,409	3,372	688	775	857	929	774	874	905
Electric transmission and distribution equipment	361,3825				181	189	204	239	205	224	225
Electrical industrial apparatus	362				187	231	263	264	260	306	299
Other electrical equipment and supplies	363-64,369				320	355	390	426	309	344	381
Communication equipment and electronic components	365-67				2,927	3,234	3,621	3,896	3,911	4,483	5,038
Motor vehicles and other transportation equipment	37, except 372,376	956	1,139	1,138	1,341	1,668	2,014	1,994	1,924	2,263	2,611
Motor vehicles and equipment	371	860	1,051	1,046	1,228	1,470	1,824	1,784	1,720	(2)	(2)
Other transportation equipment	373-75,379	96	88	90	113	198	190	210	204	193	201
Aircraft and parts	372	2,370	2,579	2,556	2,486	2,396	2,548	2,420	2,265	2,733	3,125
Professional and scientific instruments	38, except 3825	719	814	724	652	647	981	1,090	1,002	1,140	1,276
Other product fields, not elsewhere classified		1,013	1,124	1,191	1,172	1,433	1,456	1,731	2,975	3,166	3,219

[1] Distributed according to SIC code from 1968 to present.

[2] Not separately available but included in total.

SOURCE: National Science Foundation

Table 46. Funds for industrial energy R&D performance by primary energy source: 1972–79

[Dollars in millions]

Primary energy source	1972	1973	1974	1975	1976	1977	1978	1979 (Projected)
Total	750	1,009	1,339	1,774	2,073	2,599	3,069	3,365
Fossil fuels	(1)	438	516	550	605	765	859	1,006
Oil	(1)	297	329	333	381	454	(1)	(1)
Gas	(1)	51	74	66	68	94	(1)	(1)
Shale	(1)	12	16	19	24	35	(1)	(1)
Coal	(1)	49	65	109	127	177	(1)	(1)
Synthetic fossil fuels	(1)	(1)	21	50	74	116	(1)	(1)
Mining	(1)	(1)	5	9	10	9	(1)	(1)
Other	(1)	(1)	39	50	43	52	(1)	(1)
Other fossil fuels	(1)	29	30	23	5	5	(1)	(1)
Nuclear	(1)	501	601	700	799	935	1,006	1,036
Fission	(1)	476	567	659	741	852	(1)	(1)
Fusion	(1)	25	34	41	58	83	(1)	(1)
All other energy	(1)	70	222	524	669	899	1,204	1,321
Geothermal	(1)	1	2	6	13	24	(1)	(1)
Solar	(1)	2	7	19	43	65	(1)	(1)
Conservation and utilization	(1)	(1)	137	435	528	694	(1)	(1)
All other sources	(1)	67	76	64	85	116	(1)	(1)

(1) Category not available for reporting purposes.
SOURCE: National Science Foundation

Table 47. Funds for industrial pollution abatement R&D performance by type of pollution and source of funds: 1973–80

[Dollars in millions]

Year	Total		Source of funds		Type of pollution			
	Current dollars	Constant 1972 dollars	Federal	Company	Air[1]	Water	Solid Waste	Other
1973	603	570	35	568	461	76	10	56
1974	657	566	51	606	508	60	14	75
1975	647	509	41	606	478	71	23	75
1976	754	563	51	703	569	84	21	80
1977	901	636	56	945	676	97	28	100
1978	1,067	701	75	992	827	127	33	121
1979 (est.)	1,128	679	NA	NA	NA	NA	NA	NA
1980 (est.)	1,295	NA	NA	NA	NA	NA	NA	NA

[1] Includes automotive emission, electric power plant emissions, etc.
NOTE: Type of pollution and source of funds are in current dollars.
SOURCE: National Science Foundation

Table 48. Full-time-equivalent number of R&D scientists and engineers by industry: 1968-79

Industry	SIC code	January 1968	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Total (January)	....	376.7	384.2	367.0	350.2	357.7	360.0	363.3	364.4	382.8	405.0	429.8
Total (Annual Average)	....	381.9	375.4	358.4	353.6	358.4	361.2	363.6	373.4	393.7	417.4	NA
Food and kindred products	20	6.3	6.3	6.6	6.5	6.6	6.4	6.8	6.9	6.9	7.0	7.4
Textiles and apparel	22,23	2.5	2.9	1.8	1.8	1.9	1.8	1.8	1.8	1.7	1.7	1.9
Lumber, wood products, and furniture	24,25	.5	1.2	1.8	1.8	1.9	2.1	2.3	2.1	2.1	2.5	2.5
Paper and allied products	26	4.8	5.0	5.0	4.9	4.9	4.9	5.0	5.2	6.3	6.5	7.3
Chemicals and allied products	28	38.9	40.1	42.7	41.0	40.9	41.8	45.2	44.4	46.4	48.2	49.7
Industrial chemicals	281-82,286	22.3	21.5	21.8	19.1	19.1	19.1	21.1	20.1	20.6	17.8	18.0
Drugs and medicines	283	9.8	11.8	12.3	13.1	13.0	14.0	15.6	16.6	17.8	18.9	19.9
Other chemicals	284-85,287-89	6.8	6.8	8.6	8.8	8.8	8.7	8.5	7.8	8.0	11.5	11.8
Petroleum refining	29	9.2	9.9	9.2	8.3	8.2	8.2	8.4	8.6	8.9	9.9	10.8
Rubber products	30	6.1	7.4	6.7	6.7	7.5	7.7	8.4	8.6	9.1	7.8	8.1
Stone, clay, and glass products	32	4.1	4.6	4.3	4.1	4.2	4.5	4.5	4.6	4.5	5.1	5.3
Primary metals	33	5.9	6.5	6.6	6.4	6.0	6.4	6.3	8.1	8.4	8.1	8.2
Ferrous metals and products	331-32,3398,3399	3.1	3.2	3.4	3.4	3.2	3.3	3.3	3.9	3.9	3.6	3.7
Nonferrous metals and products	333-36	2.7	3.3	3.2	3.0	2.8	3.1	3.0	4.2	4.5	4.5	4.5
Fabricated metal products	34	5.6	5.9	7.1	6.6	6.7	7.3	7.4	6.8	7.1	7.2	7.3
Machinery	35	37.4	42.3	42.7	43.7	46.3	51.0	52.8	55.7	55.3	58.1	63.0
Office, computing and accounting machines	357	(1)	(1)	(1)	(1)	30.1	34.5	36.1	38.1	37.7	39.2	42.8
Other machinery, except electrical	35 (Balance)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	17.6	18.9	20.0
Electrical equipment	36	98.4	100.6	91.8	83.6	85.4	82.6	82.6	80.3	84.1	85.5	89.2
Radio and TV receiving equipment	365	1.0	1.9	2.4	2.1	1.4	1.3	1.0	1.1	.9	.8	.8
Electronic components	367	67.4	64.8	60.3	53.2	9.4	9.6	10.6	10.2	13.0	14.3	15.3
Communication equipment	366					45.3	42.0	40.2	37.4	38.0	40.4	43.0
Other electrical equipment	361-64,369	30.0	33.9	29.1	28.3	29.3	29.7	30.8	31.6	32.2	30.0	30.1
Motor vehicles and motor vehicles equipment	371	24.3	25.5	28.2	29.7	28.2	27.4	26.0	25.4	28.2	30.7	33.5
Other transportation equipment	373-75,379					1.7	1.8	1.9	1.7	1.9	2.4	2.6
Aircraft and missiles	372,376	101.1	92.2	78.2	70.8	72.1	70.6	67.5	66.9	72.0	81.5	86.2
Professional and scientific instruments	38	14.1	15.0	15.1	15.2	16.3	17.5	17.9	18.8	20.5	22.1	23.9
Scientific and mechanical measuring instruments	381,82	3.8	4.1	4.6	4.7	5.3	5.6	5.9	6.7	7.2	7.8	8.7
Optical, surgical, photographic, and other instruments	383-87	10.3	10.9	10.5	10.5	11.0	11.9	12.0	12.1	13.3	14.3	15.2
Other manufacturing industries	21,27,31,39	2.4 17.8	2.6 19.2	3.8	3.6	3.6	3.7	3.7	4.2	4.5	4.6	4.9
Nonmanufacturing industries	07-17,41-67,737 739,807,891	15.1	16.3	15.6	15.7	15.3	14.4	14.9	14.6	15.3	16.1	18.0

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[1] Data not tabulated at this level prior to 1972.

[2] Data not tabulated at this level prior to 1977.

SOURCE: National Science Foundation

Table 49. Full-time-equivalent R&D scientists and engineers per 1,000 employees by industry: 1968–77

Industry and size of company	SIC code	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Total		26	26	26	26	24	24	25	26	27	27[1]
Food and kindred products	20	8	7	7	7	7	7	7	7	7	7
Textiles and apparel	22,23	4	4	4	3	3	3	3	3	3	3
Lumber, wood products, and furniture	24,25	4	5	6	7	6	7	7	7	7	7
Paper and allied products	26	6	6	8	8	8	8	8	10	12	12
Chemicals and allied products	28	35	35	39	41	39	38	40	41	40	42
Industrial chemicals	281–82	32	32	34	34	33	33	34	35	34	35
Drugs and medicines	283	48	48	65	65	60	57	57	59	64	64
Other chemicals	284–89	31	32	31	34	34	33	36	36	34	34
Petroleum refining and extraction	29,13	15	16	17	17	16	17	18	19	17	18
Rubber products	30	17	17	17	15	16	17	17	20	21	21
Stone, clay, and glass products	32	10	10	11	11	10	10	11	11	11	11
Primary metals	33	5	6	6	6	6	5	5	7	8	8
Ferrous metals and products	331-32,3398,3399	4	4	4	4	4	4	4	5	5	5
Nonferrous metals and products	333-36	8	9	10	9	8	9	9	11	15	15
Fabricated metal products	34	12	12	10	11	10	11	11	12	12	12
Machinery	35	26	27	28	29	31	31	34	36	38	37
Office, computing, and accounting machines	357	(2)	(2)	(2)	(2)	66	65	67	76	79	76
Electrical equipment and communication	36,48	45	42	41	38	37	37	37	40	42	41
Radio and TV receiving equipment	365	22	32	32	35	26	20	18	16	15	13
Electronic components	367	58	50	46	43	39	40	40	49	55	54
Communication equipment and communication	366,48					42	43	43	44	45	45
Other electrical equipment	361–64,369	33	33	35	32	31	31	32	36	36	36
Motor vehicles and motor vehicles equipment	371	19	19	20	22	23	22	24	25	25	25
Other transportation equipment	373–75,379					14	13	13	13	14	14
Aircraft and missiles	372,376	81	80	73	74	76	68	72	72	78	80
Professional and scientific instruments	38	37	34	29	33	33	34	35	38	41	41
Scientific and mechanical measuring instruments	381–82	29	28	27	31	31	33	35	41	45	45
Optical, surgical, photographic and other instruments	383–87	40	36	32	33	34	35	35	37	38	39
Other manufacturing industries	21,27,31,39	6	7	6	7	6	6	6	7	8	7
Nonmanufacturing industries	07–12,14–17,41–47, 49–67,737, 739,807,891	12	12	23	22	21	18	17	16	19	18

[1] The number of R&D scientists and engineers for 1977 is derived by dividing the arithmetic mean of scientists and engineers employed in January 1977 and January 1978 by the number of company employees in all activities in March 1977. Similar procedures were used in earlier years except 1968 and 1969 in which data were derived by dividing the man-years of R&D scientists and engineers for the year by the March employment figures.

[2] Data not tabulated at this level prior to 1972.

SOURCE: National Science Foundation

TABLE 50. R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES BY SOURCE AND FIELD: FISCAL YEARS 1968-78

(DOLLARS IN THOUSANDS)

SOURCE AND FIELD	1968	1970	1972	1973	1974	1975	1976	1977	1978 1/
TOTAL	2,148,708	2,334,859	2,676,511	2,884,521	3,022,781	3,408,417	3,727,553	4,364,338	4,614,864
SOURCE OF FUNDS:									
FEDERAL GOVERNMENT	1,572,064	1,647,500	1,838,933	1,985,808	2,032,593	2,287,881	2,511,880	2,728,970	3,056,940
STATE AND LOCAL GOVERNMENT	172,195	218,777	269,918	295,020	307,439	332,338	363,650	374,281	414,426
INDUSTRY	55,253	60,538	75,270	84,046	96,058	113,273	123,486	139,244	170,255
INSTITUTIONAL FUNDS	217,810	243,051	305,520	318,443	368,877	416,584	444,348	507,598	614,715
ALL OTHER OUTSIDE SOURCES	131,386	164,993	186,870	201,204	217,814	258,341	284,189	314,245	358,528
FIELD OF SCIENCE:									
ENGINEERING	309,137	318,836	347,341	333,858	347,970	382,176	433,248	497,266	601,113
PHYSICAL SCIENCES	319,739	307,310	329,900	328,426	333,597	350,443	379,558	428,827	496,860
ASTRONOMY	24,103	18,597	21,974	24,114	24,427	26,611	26,294	32,361	36,782
CHEMISTRY	104,695	102,002	110,015	113,802	115,894	120,835	140,261	163,607	182,470
PHYSICS	172,660	161,921	161,853	167,062	169,251	173,545	183,088	201,336	234,613
OTHER, N.E.C.	18,281	24,790	36,058	23,448	24,025	29,452	29,915	31,523	42,995
ENVIRONMENTAL SCIENCES	120,463	125,315	192,331	209,615	235,094	255,197	286,925	317,465	378,390
MATHEMATICAL SCIENCES	57,621	72,413	70,536	72,758	76,707	85,320	87,010	106,624	124,211
MATHEMATICS 2/	0	0	0	37,100	37,517	39,715	42,505	51,403	57,707
COMPUTER SCIENCES 2/	0	0	0	35,658	39,190	45,605	44,505	55,221	66,504
LIFE SCIENCES	1,037,031	1,194,249	1,352,601	1,529,377	1,631,455	1,900,341	2,101,114	2,260,213	2,535,790
BIOLOGICAL SCIENCES	490,607	547,193	451,239	557,563	511,192	631,218	711,703	771,011	859,428
AGRICULTURAL SCIENCES 3/	0	0	231,057	275,552	346,209	382,120	411,307	464,459	496,709
MEDICAL SCIENCES	477,346	549,121	604,987	645,709	716,080	811,545	897,376	950,012	1,093,489
OTHER, N.E.C.	69,078	97,935	65,318	50,553	57,974	75,458	80,728	74,731	86,164
PSYCHOLOGY	59,286	59,250	70,400	73,852	74,300	79,849	77,998	84,138	89,306
SOCIAL SCIENCES	167,986	168,669	206,344	231,347	240,895	256,276	262,444	265,545	275,001
ECONOMICS	35,017	38,616	46,586	47,799	47,831	56,108	65,652	70,212	79,025
POLITICAL SCIENCE	20,742	19,273	21,771	25,523	27,039	29,405	28,382	32,506	35,877
SOCIOLOGY	38,587	44,383	59,475	61,514	63,478	68,764	66,250	61,428	66,590
OTHER, N.E.C.	73,640	66,397	78,512	96,511	102,547	101,999	102,160	101,399	93,509
OTHER SCIENCES, N.E.C.	77,445	88,817	107,058	105,288	82,763	98,815	99,256	104,260	114,193

1/ ESTIMATED, BASED ON DATA COLLECTED FROM DOCTORATE-GRANTING INSTITUTIONS ONLY.
2/ NOT SEPARATELY AVAILABLE PRIOR TO 1973.
3/ NOT SEPARATELY AVAILABLE PRIOR TO 1972, INCLUDED IN BIOLOGICAL SCIENCES;
ESTIMATED FOR 1972 AND 1973, BASED ON DATA COLLECTED IN 1974.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 51. R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES BY SOURCE AND CHARACTER OF WORK: FISCAL YEARS 1968-78

(DOLLARS IN THOUSANDS)

YEAR	TOTAL			FEDERAL		
	BASIC RESEARCH	APPLIED RESEARCH	DEVELOPMENT	BASIC RESEARCH	APPLIED RESEARCH	DEVELOPMENT
1968	1,649,616	403,643	95,449	1,250,782	253,577	67,705
1970	1,795,864	426,714	112,281	1,296,120	267,651	83,729
1972	2,022,185	544,178	110,148	1,420,198	338,425	80,310
1973	2,053,279	697,863	133,379	1,454,463	444,813	86,532
1974	2,154,056	735,328	133,397	1,523,426	438,063	71,104
1975	2,409,680	849,648	149,089	1,695,241	514,567	78,073
1976	2,547,771	1,012,113	167,669	1,841,234	578,138	92,508
1977	2,796,591	1,060,349	207,398	2,008,723	601,397	118,850
1978 1/	3,175,397	1,203,976	235,491	2,250,133	673,673	133,134

1/ ESTIMATED, BASED ON DATA COLLECTED IN 1977.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 52. R&D EXPENDITURES AT DOCTORATE-GRANTING INSTITUTIONS BY SOURCE AND FIELD: FISCAL YEARS 1968-78

(DOLLARS IN THOUSANDS)

SOURCE AND FIELD	1968	1970	1972	1973	1974	1975	1976	1977	1978
TOTAL	2,092,214	2,286,182	2,614,642	2,809,723	2,948,900	3,334,031	3,654,302	3,985,168	4,530,112
SOURCE OF FUNDS:									
FEDERAL GOVERNMENT	1,532,312	1,615,276	1,798,686	1,938,647	1,985,707	2,236,964	2,464,494	2,680,227	3,003,077
STATE AND LOCAL GOVERNMENT	168,619	214,197	261,362	282,729	295,080	325,901	356,348	365,898	406,381
INDUSTRY	53,116	58,479	73,863	81,861	93,886	113,419	120,449	135,468	166,144
INSTITUTIONAL FUNDS	211,654	237,588	298,637	310,749	361,683	408,520	435,369	496,240	602,795
ALL OTHER OUTSIDE SOURCES	126,313	160,642	182,094	195,737	212,544	252,227	277,642	307,335	351,715
FIELD OF SCIENCE:									
ENGINEERING	300,526	311,487	341,121	328,935	345,034	378,371	426,695	489,724	592,013
PHYSICAL SCIENCES	307,225	297,767	320,300	315,915	322,299	338,609	366,620	416,011	481,906
ASTRONOMY	23,803	18,356	21,756	23,853	24,185	26,398	26,094	32,117	36,505
CHEMISTRY	97,609	97,303	105,656	108,175	110,704	115,063	133,715	156,707	174,775
PHYSICS	168,343	158,182	157,414	162,238	165,324	169,345	179,034	197,542	230,192
OTHER, N.E.C.	17,471	23,926	35,474	21,649	22,086	27,803	27,777	29,645	40,434
ENVIRONMENTAL SCIENCES	114,970	121,634	187,242	203,246	228,011	245,903	277,882	307,349	366,333
MATHEMATICAL SCIENCES	55,608	70,389	68,710	70,633	74,863	82,330	84,674	102,795	119,706
MATHEMATICS 1/	0	0	0	35,603	36,496	37,918	41,343	50,141	56,291
COMPUTER SCIENCES 1/	0	0	0	35,030	38,367	44,412	43,331	52,654	63,415
LIFE SCIENCES	1,021,373	1,181,772	1,332,063	1,506,371	1,605,679	1,880,986	2,081,111	2,236,144	2,512,917
BIOLOGICAL SCIENCES	477,614	537,253	443,104	547,894	501,374	623,769	701,179	757,649	844,534
AGRICULTURAL SCIENCES 2/	0	0	229,340	273,414	334,535	375,539	404,798	457,599	489,373
MEDICAL SCIENCES	475,612	547,083	595,163	635,919	713,870	809,885	895,718	946,723	1,093,489
OTHER, N.E.C.	68,147	97,436	64,456	49,144	55,900	74,793	79,416	74,173	85,521
PSYCHOLOGY	53,881	56,280	67,115	70,175	70,206	73,907	74,727	81,204	86,192
SOCIAL SCIENCES	159,607	161,627	194,974	213,350	223,359	238,905	247,620	252,183	261,782
ECONOMICS	33,968	37,709	45,461	45,943	46,287	54,188	64,558	68,913	77,563
POLITICAL SCIENCE	20,042	18,362	20,944	24,330	26,337	28,132	27,113	31,336	34,586
SOCIOLOGY	36,889	43,157	53,253	52,513	55,614	62,019	62,634	56,824	63,768
OTHER, N.E.C.	68,708	62,399	75,316	90,564	95,121	94,566	93,315	93,110	85,665
OTHER SCIENCES, N.E.C.	79,023	85,226	103,117	101,098	79,449	94,020	94,973	99,758	109,263

1/ NOT SEPARATELY AVAILABLE PRIOR TO 1973.
2/ NOT SEPARATELY AVAILABLE PRIOR TO 1972, INCLUDED IN BIOLOGICAL SCIENCES; ESTIMATED FOR 1972 AND 1973, BASED ON DATA COLLECTED IN 1974.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 53. FEDERALLY FINANCED R&D EXPENDITURES AT UNIVERSITIES AND COLLEGES BY FIELD: FISCAL YEARS 1968-78

(DOLLARS IN THOUSANDS)

FIELD	1968	1970	1972	1973	1974	1975	1976	1977	1978 1/
TOTAL	1,572,064	1,647,500	1,838,933	1,985,808	2,032,593	2,287,881	2,511,880	2,728,970	3,056,940
FIELD OF SCIENCE:									
ENGINEERING	246,191	245,888	259,058	238,445	240,063	260,154	291,386	336,158	407,591
PHYSICAL SCIENCES	273,048	257,822	267,392	268,461	270,190	284,997	305,393	343,323	393,414
ASTRONOMY	21,079	15,516	16,854	17,697	17,101	19,524	18,351	23,230	26,349
CHEMISTRY	82,668	78,942	84,582	86,559	88,692	92,706	107,928	125,162	136,193
PHYSICS	156,241	144,306	139,629	145,519	146,515	149,874	156,027	171,878	199,099
OTHER, N.E.C.	13,060	19,058	26,327	18,686	17,882	22,893	23,087	23,053	29,773
ENVIRONMENTAL SCIENCES	88,691	88,127	142,110	157,737	168,412	180,624	211,478	238,175	275,103
MATHEMATICAL SCIENCES	45,610	54,338	53,207	53,692	58,103	65,100	65,807	78,133	85,193
MATHEMATICS 2/	0	0	0	28,762	29,405	31,221	32,884	40,596	44,116
COMPUTER SCIENCES 2/	0	0	0	24,930	28,698	33,879	32,923	37,537	44,077
LIFE SCIENCES	725,017	814,417	884,212	1,014,441	1,052,697	1,237,656	1,380,797	1,474,093	1,624,716
BIOLOGICAL SCIENCES	306,471	334,851	319,625	399,003	366,055	457,472	522,725	575,382	624,800
AGRICULTURAL SCIENCES 3/	0	0	80,228	93,854	100,952	112,175	121,936	134,484	144,488
MEDICAL SCIENCES	381,936	431,656	448,805	486,045	543,663	613,798	677,509	710,471	793,593
OTHER, N.E.C.	36,610	47,910	35,554	35,539	42,027	54,211	58,627	53,756	61,835
PSYCHOLOGY	48,547	47,263	54,865	58,645	58,554	61,193	59,378	63,837	64,087
SOCIAL SCIENCES	100,846	94,655	113,935	132,573	137,070	141,503	138,424	137,846	140,549
ECONOMICS	17,537	17,688	20,940	22,781	22,292	27,081	29,256	31,111	37,179
POLITICAL SCIENCE	10,444	7,920	8,592	10,362	11,902	12,287	11,986	14,954	15,888
SOCIOLOGY	26,095	26,220	35,694	40,486	41,295	45,061	41,118	37,963	41,106
OTHER, N.E.C.	46,770	42,827	48,709	58,944	61,581	57,074	56,064	53,818	46,376
OTHER SCIENCES, N.E.C.	44,114	44,990	64,154	61,814	47,504	56,654	59,217	57,405	66,287

1/ ESTIMATED, BASED ON DATA COLLECTED FROM DOCTORATE-GRANTING INSTITUTIONS ONLY.
2/ NOT SEPARATELY AVAILABLE PRIOR TO 1973.
3/ NOT SEPARATELY AVAILABLE PRIOR TO 1972, INCLUDED IN BIOLOGICAL SCIENCES; ESTIMATED FOR 1972 AND 1973, BASED ON DATA COLLECTED IN 1974.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 54. FEDERALLY FINANCED R&D EXPENDITURES AT DOCTORATE-GRANTING INSTITUTIONS BY FIELD: FISCAL YEARS 1968-78

(DOLLARS IN THOUSANDS)

SOURCE AND FIELD	1968 1/	1970 1/	1972 1/	1973	1974	1975	1976	1977	1978
TOTAL	1,532,312	1,615,276	1,798,686	1,938,647	1,985,707	2,236,964	2,464,494	2,680,227	3,003,077
FIELD OF SCIENCE:									
ENGINEERING	213,819	209,904	224,904	235,107	237,845	257,287	287,476	331,716	402,206
PHYSICAL SCIENCES	259,232	258,954	254,540	259,807	262,940	277,362	296,806	335,095	384,072
ASTRONOMY	20,494	14,509	16,256	17,479	16,901	19,340	18,208	23,028	26,120
CHEMISTRY	76,388	75,790	79,738	83,240	85,434	88,690	103,186	120,561	133,113
PHYSICS	150,128	145,635	133,351	141,752	143,549	146,812	153,001	168,955	195,714
OTHER, N.E.C.	12,222	23,020	25,195	17,336	17,056	22,520	22,411	22,551	29,125
ENVIRONMENTAL SCIENCES	81,617	77,259	135,209	153,379	163,770	175,439	205,618	231,349	267,219
MATHEMATICAL SCIENCES	39,000	46,869	45,272	52,598	57,012	63,328	64,637	76,362	83,261
MATHEMATICS 2/	0	0	0	27,992	28,791	30,117	32,336	39,930	43,393
COMPUTER SCIENCES 2/	0	0	0	24,606	28,221	33,211	32,301	36,432	39,868
LIFE SCIENCES	694,590	762,754	846,910	1,001,593	1,037,862	1,222,765	1,366,005	1,457,132	1,606,269
BIOLOGICAL SCIENCES	287,003	294,735	302,399	392,127	359,096	449,875	515,275	565,810	614,406
AGRICULTURAL SCIENCES 3/	0	0	76,504	92,574	96,158	106,753	116,811	129,603	139,244
MEDICAL SCIENCES	371,633	414,064	433,124	482,374	542,325	612,407	676,172	708,249	791,112
OTHER, N.E.C.	35,954	53,955	34,883	34,518	40,283	53,730	57,747	53,470	61,507
PSYCHOLOGY	43,540	42,916	511,91	55,847	55,570	56,886	56,855	61,693	61,935
SOCIAL SCIENCES	93,349	89,392	102,889	120,528	124,991	130,168	130,832	132,490	135,309
ECONOMICS	16,688	16,856	19,696	21,912	21,257	25,671	26,684	30,386	36,313
POLITICAL SCIENCE	9,874	6,845	8,027	9,983	11,533	11,623	11,551	14,438	15,340
SOCIOLOGY	24,311	24,919	29,600	33,212	34,589	39,433	38,929	36,694	39,732
OTHER, N.E.C.	42,476	40,772	45,566	55,421	57,612	53,441	51,668	50,972	43,924
OTHER SCIENCES, N.E.C.	42,977	43,497	62,152	59,788	45,717	53,729	56,265	54,390	62,806

1/ DEVELOPMENT EXPENDITURES NOT INCLUDED IN FIELD OF SCIENCE DISTRIBUTIONS.
2/ NOT SEPARATELY AVAILABLE PRIOR TO 1973.
3/ NOT SEPARATELY AVAILABLE PRIOR TO 1972, INCLUDED IN BIOLOGICAL SCIENCES; ESTIMATED FOR 1972 AND 1973. BASED ON DATA COLLECTED IN 1974.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 55. TOTAL AND FEDERALLY FINANCED CAPITAL EXPENDITURES FOR SCIENTIFIC ACTIVITIES AT UNIVERSITIES AND COLLEGES BY SOURCE AND FIELD: FISCAL YEARS 1968-77 1/

(DOLLARS IN THOUSANDS)

SOURCE AND FIELD	1968	1970	1972	1973	1974	1975	1976	1977
ALL SOURCES	1,070,727	951,873	914,844	838,241	836,412	1,016,519	1,041,030	960,430
ENGINEERING	126,304	132,623	87,307	55,735	91,784	118,390	81,716	88,233
PHYSICAL SCIENCES	283,811	225,268	68,223	108,868	89,271	80,280	73,521	65,239
ENVIRONMENTAL SCIENCES 2/	0	0	96,295	26,624	24,178	35,241	47,791	28,393
MATHEMATICAL AND COMPUTER SCIENCES	55,104	38,160	24,712	20,016	23,669	15,042	24,677	23,592
LIFE SCIENCES	452,707	418,472	517,941	488,680	494,473	668,681	706,844	644,779
PSYCHOLOGY	34,425	22,036	19,007	39,566	15,511	11,530	9,119	12,737
SOCIAL SCIENCES	76,217	62,049	59,993	61,217	59,346	49,708	44,027	30,997
OTHER SCIENCES, N.E.C.	42,159	53,265	41,366	37,535	38,180	37,647	53,335	66,460
FEDERAL GOVERNMENT	340,447	279,316	239,193	224,523	225,511	269,965	206,622	195,496
ENGINEERING	39,432	38,263	23,439	13,531	42,681	64,026	20,140	17,277
PHYSICAL SCIENCES	95,178	63,107	18,551	24,473	20,619	18,832	19,138	21,894
ENVIRONMENTAL SCIENCES 2/	0	0	17,827	5,873	7,059	5,884	6,313	9,317
MATHEMATICAL AND COMPUTER SCIENCES	13,675	9,536	4,341	3,022	4,257	2,584	2,048	1,882
LIFE SCIENCES	150,591	142,718	152,328	161,934	139,745	169,412	153,528	137,368
PSYCHOLOGY	10,342	4,848	3,663	5,101	2,528	2,236	1,955	2,388
SOCIAL SCIENCES	17,627	10,303	10,939	5,371	4,477	2,766	1,813	2,087
OTHER SCIENCES, N.E.C.	13,601	10,541	8,105	5,218	4,145	4,225	1,687	3,283
OTHER SOURCES	730,280	672,557	675,651	613,718	610,901	746,554	834,408	764,934
ENGINEERING	86,872	94,360	63,868	42,204	49,103	54,364	61,576	70,956
PHYSICAL SCIENCES	188,633	162,161	49,672	84,395	68,652	61,448	54,383	43,345
ENVIRONMENTAL SCIENCES 2/	0	0	78,468	20,751	17,119	29,357	41,478	19,076
MATHEMATICAL AND COMPUTER SCIENCES	41,428	28,624	20,371	16,994	19,412	12,458	22,629	21,710
LIFE SCIENCES	302,116	275,754	365,613	326,746	354,728	499,269	553,316	507,411
PSYCHOLOGY	24,083	17,188	15,344	34,465	12,983	9,294	7,164	10,349
SOCIAL SCIENCES	58,590	51,746	49,054	55,846	54,869	46,942	42,214	28,910
OTHER SCIENCES, N.E.C.	28,558	42,724	33,261	32,317	34,035	33,422	51,648	63,177

1/ DATA FOR 1978 ARE NOT AVAILABLE.
2/ NOT SEPARATELY AVAILABLE FOR 1968 AND 1970, INCLUDED IN PHYSICAL SCIENCES; ESTIMATED FOR 1972.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 56. TOTAL AND FEDERALLY FINANCED CAPITAL EXPENDITURES FOR SCIENTIFIC ACTIVITIES AT DOCTORATE-GRANTING INSTITUTIONS BY SOURCE AND FIELD: FISCAL YEARS 1968-77 1/

(DOLLARS IN THOUSANDS)

SOURCE AND FIELD	1968	1970	1972	1973	1974	1975	1976	1977
ALL SOURCES	759,322	735,333	813,070	763,118	752,670	894,442	972,586	896,971
ENGINEERING	82,537	95,834	67,761	50,626	58,690	63,290	69,948	85,076
PHYSICAL SCIENCES	180,260	161,034	111,672	91,911	82,563	68,755	64,905	57,267
ENVIRONMENTAL SCIENCES 2/	0	0	20,414	23,469	21,707	26,675	41,184	26,152
MATHEMATICAL AND COMPUTER SCIENCES	34,324	26,150	18,639	18,219	21,492	11,317	18,245	19,870
LIFE SCIENCES	364,396	363,258	496,369	465,076	476,669	645,541	686,985	609,476
PSYCHOLOGY	12,270	11,971	15,570	36,644	14,063	10,211	8,102	7,955
SOCIAL SCIENCES	52,559	40,694	51,441	56,037	53,193	42,474	36,518	29,001
OTHER SCIENCES, N.E.C.	32,976	36,392	31,204	21,136	24,293	26,179	46,699	62,174
FEDERAL GOVERNMENT	263,355	223,330	220,514	212,036	190,160	212,181	196,655	188,213
ENGINEERING	29,192	25,381	16,538	12,556	11,878	13,128	14,767	16,918
PHYSICAL SCIENCES	70,358	46,600	23,638	22,133	19,804	18,151	18,254	20,815
ENVIRONMENTAL SCIENCES 2/	0	0	8,059	5,541	6,653	5,650	6,125	9,041
MATHEMATICAL AND COMPUTER SCIENCES	7,520	6,712	3,957	2,707	3,932	1,669	1,832	1,707
LIFE SCIENCES	130,963	126,599	149,587	154,496	137,752	167,446	150,789	132,897
PSYCHOLOGY	2,730	2,845	3,163	4,569	2,466	2,083	1,797	1,658
SOCIAL SCIENCES	11,110	6,963	8,814	5,062	3,782	2,167	1,525	1,989
OTHER SCIENCES, N.E.C.	11,482	8,230	6,758	4,972	3,893	1,887	1,566	3,188
OTHER SOURCES	495,967	512,003	592,556	551,082	562,510	682,261	775,931	708,758
ENGINEERING	53,345	70,453	51,223	38,070	46,812	50,162	55,181	68,158
PHYSICAL SCIENCES	109,902	114,434	88,034	69,778	62,759	50,604	46,651	36,452
ENVIRONMENTAL SCIENCES 2/	0	0	12,355	17,928	15,054	21,025	35,059	17,111
MATHEMATICAL AND COMPUTER SCIENCES	26,804	19,438	14,682	15,512	17,560	9,648	16,413	18,163
LIFE SCIENCES	233,433	236,659	346,782	310,580	338,917	478,095	536,196	476,579
PSYCHOLOGY	9,540	9,126	12,407	32,075	11,597	8,128	6,305	6,297
SOCIAL SCIENCES	41,449	33,731	42,627	50,975	49,411	40,307	34,993	27,012
OTHER SCIENCES, N.E.C.	21,494	28,162	24,446	16,164	20,400	24,292	45,133	58,986

1/ DATA FOR 1978 ARE NOT AVAILABLE.
2/ NOT SEPARATELY AVAILABLE FOR 1968 AND 1970, INCLUDED IN PHYSICAL SCIENCES; ESTIMATED FOR 1972.
SOURCE: NATIONAL SCIENCE FOUNDATION

Table 57. R&D expenditures of university-administered federally funded research and development centers: 1968, 1970, and 1972–78

[Dollars in thousands]

Year	All FFRDC's		17 matched FFRDC's[1]	
	Current dollars	Constant dollars[2]	Current dollars	Constant dollars[2]
1968	718,930	873,548	635,674	772,386
1970	736,847	810,613	656,575	722,305
1972	763,563	763,563	687,028	687,028
1973	816,923	782,493	748,867	717,306
1974	865,098	768,976	790,649	702,799
1975	986,736	791,923	911,100	731,220
1976	1,146,712	860,249	1,066,520	800,090
1977	1,383,814	972,462	1,296,618	911,186
1978	1,716,911	1,129,547	1,712,657	1,126,748

[1] These 17 FFRDC's were in existence throughout the period.

[2] Based on the GNP implicit price deflator.

SOURCE: National Science Foundation

TABLE 58. R&D EXPENDITURES AT UNIVERSITY-ADMINISTERED FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS BY FIELD: FISCAL YEARS 1968-78

(DOLLARS IN THOUSANDS)

FIELD	1968	1970	1972	1973	1974	1975	1976	1977	1978
TOTAL	718,930	736,847	763,563	816,923	865,098	986,736	1,146,712	1,383,814	1,716,911
FIELD OF SCIENCE:									
ENGINEERING	178,945	189,060	198,070	251,539	259,080	275,682	299,683	380,420	522,213
PHYSICAL SCIENCES	410,362	428,189	431,864	425,107	455,418	523,160	622,887	736,802	854,455
ASTRONOMY	27,330	19,765	28,473	28,055	29,944	31,153	32,452	41,500	38,452
CHEMISTRY	61,718	71,229	75,395	73,114	64,920	69,658	96,268	111,564	97,529
PHYSICS	306,294	317,549	309,266	318,002	268,187	322,464	376,632	447,110	568,040
OTHER, N.E.C.	15,020	19,646	18,730	5,936	92,367	99,885	117,535	136,628	150,434
ENVIRONMENTAL SCIENCES	27,875	26,970	37,186	40,647	47,864	63,175	77,476	100,981	128,217
MATHEMATICAL SCIENCES	37,147	38,213	41,738	53,178	54,339	62,416	71,641	78,584	119,203
MATHEMATICS 1/	0	0	0	14,744	16,002	17,715	22,063	15,358	8,100
COMPUTER SCIENCES 1/	0	0	0	38,434	38,337	44,701	49,578	63,226	111,103
LIFE SCIENCES	32,602	34,176	36,346	33,964	34,367	42,284	50,198	57,949	58,439
BIOLOGICAL SCIENCES	26,352	26,804	29,204	24,344	26,211	31,661	38,253	43,569	48,154
AGRICULTURAL SCIENCES 2/	0	0	0	35	0	0	0	354	1,206
MEDICAL SCIENCES	5,634	6,753	3,707	3,312	3,877	4,963	5,081	4,761	7,963
OTHER, N.E.C.	616	619	3,435	6,273	4,279	5,660	6,864	9,265	1,116
PSYCHOLOGY	5,661	1,506	1,447	898	850	306	92	87	103
SOCIAL SCIENCES	8,945	5,059	8,686	169	330	795	1,288	3,301	5,119
ECONOMICS	149	20	0	0	14	795	1,277	3,280	3,875
POLITICAL SCIENCE	336	220	91	0	0	0	0	0	1,244
SOCIOLOGY	604	102	55	169	316	0	0	0	0
OTHER, N.E.C.	7,856	4,717	8,540	0	0	0	11	21	0
OTHER SCIENCES, N.E.C.	17,393	13,674	8,226	11,421	12,850	18,918	23,447	25,690	29,162

1/ NOT SEPARATELY AVAILABLE PRIOR TO 1973.

2/ NOT SEPARATELY AVAILABLE PRIOR TO 1972, INCLUDED IN BIOLOGICAL SCIENCES; ESTIMATED FOR 1972 AND 1973, BASED ON DATA COLLECTED IN 1974.

SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 59. R&D EXPENDITURES AT UNIVERSITY-ADMINISTERED FEDERALLY FUNDED RESEARCH AND DEVELOPMENT CENTERS BY CHARACTER OF WORK: FISCAL YEARS 1968-78

(DOLLARS IN THOUSANDS)

YEAR	TOTAL	BASIC RESEARCH		APPLIED RESEARCH		DEVELOPMENT	
		AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL	AMOUNT	PERCENT OF TOTAL
1968	718,930	275,595	38.3%	231,207	32.2%	212,128	29.5%
1970	736,847	268,732	36.4	215,587	27.7	252,528	36.0
1972	763,563	250,167	32.8	225,452	29.5	287,944	37.7
1973	816,923	296,492	36.3	226,376	27.7	294,055	36.0
1974	865,098	285,082	33.0	217,056	25.1	362,960	42.0
1975	986,736	309,195	31.3	263,960	26.8	413,581	41.9
1976	1,146,712	358,811	31.3	327,149	28.5	460,752	40.2
1977	1,383,814	402,168	29.1	464,519	33.6	517,127	37.4
1978 1/................	1,716,911	498,974	29.1	576,333	33.6	641,604	37.4

1/ ESTIMATED, BASED ON DATA COLLECTED IN 1977.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 60. POSTDOCTORALS IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD AND SOURCE OF SUPPORT: FALL 1974-77 1/

FIELD	TOTAL				FEDERAL				NONFEDERAL			
	1974	1975	1976	1977	1974	1975	1976	1977	1974	1975	1976	1977
TOTAL	16,675	17,066	18,691	19,867	11,807	12,046	13,197	13,524	4,868	5,020	5,494	6,343
ENGINEERING	1,029	1,165	1,204	1,231	705	807	857	925	324	358	347	306
AERONAUTICAL	33	38	39	48	19	26	33	39	14	12	6	9
AGRICULTURAL	28	38	44	27	8	20	23	15	20	18	21	12
BIOMEDICAL	25	35	51	67	22	26	34	41	3	9	17	26
CHEMICAL	186	233	233	227	117	136	160	173	69	97	73	54
CIVIL	78	98	97	135	49	55	71	90	29	43	26	45
ELECTRICAL	175	169	173	168	121	128	128	137	54	41	45	31
ENGINEERING SCIENCE	141	116	97	107	130	99	85	91	11	17	12	16
INDUSTRIAL	46	42	18	20	14	24	9	8	32	18	9	12
MECHANICAL	75	93	158	146	47	66	102	109	28	27	56	37
METALLURGICAL/MATERIALS	173	212	214	210	136	161	159	171	37	51	55	39
MINING	10	13	16	14	10	11	15	13	0	2	1	1
NUCLEAR	20	41	32	21	9	27	17	10	11	14	15	11
PETROLEUM	3	1	2	5	1	0	2	4	2	1	0	1
ENGINEERING, N.E.C.	36	36	30	36	22	28	19	24	14	8	11	12
PHYSICAL SCIENCES	3,853	3,927	4,033	4,191	3,060	3,114	3,272	3,411	793	813	761	780
ASTRONOMY	147	103	131	155	114	76	97	115	33	27	34	40
CHEMISTRY	2,365	2,499	2,592	2,643	1,780	1,874	2,024	2,098	585	625	568	545
PHYSICS	1,337	1,319	1,309	1,392	1,162	1,164	1,151	1,198	175	155	158	194
PHYSICAL SCIENCES, N.E.C.	4	6	1	1	4	0	0	0	0	6	1	1
ENVIRONMENTAL SCIENCES	294	300	403	388	237	227	308	316	57	73	95	72
ATMOSPHERIC SCIENCES	58	48	63	62	53	42	60	59	5	6	3	3
GEOSCIENCES	151	167	254	234	112	126	193	196	39	41	61	38
OCEANOGRAPHY	63	62	62	69	56	42	40	49	7	20	22	20
ENVIRONMENTAL SCIENCES, N.E.C.	22	23	24	23	16	17	15	12	6	6	9	11
MATHEMATICAL SCIENCES	148	168	191	150	94	72	91	92	54	96	100	58
COMPUTER SCIENCE	54	40	64	59	39	28	41	51	15	12	23	8
MATHEMATICS AND APPLIED MATHEMATICS	78	101	104	74	46	32	44	36	32	69	60	38
STATISTICS	16	27	23	17	9	12	6	5	7	15	17	12
LIFE SCIENCES	10,585	10,844	12,116	13,119	7,312	7,461	8,252	8,359	3,273	3,383	3,864	4,760
AGRICULTURAL SCIENCES	296	291	370	334	160	134	207	183	136	157	163	151
BIOLOGICAL SCIENCES	5,256	5,749	6,227	6,503	3,955	4,390	4,880	4,936	1,301	1,359	1,347	1,567
ANATOMY	216	198	179	223	149	150	134	159	67	48	45	64
BIOCHEMISTRY	1,375	1,356	1,423	1,428	1,065	1,108	1,149	1,153	310	248	274	275
BIOLOGY	711	771	817	880	502	527	655	649	209	244	162	231
BIOMETRY/EPIDEMIOLOGY	21	17	22	50	12	12	16	32	9	5	6	18
BIOPHYSICS	182	223	241	233	151	190	212	211	31	33	29	22
BOTANY	130	138	135	145	91	67	71	93	39	71	64	52
CELL BIOLOGY	203	210	242	238	166	178	205	178	37	32	37	60
ECOLOGY	3	32	10	11	2	28	8	9	1	4	2	2
ENTOMOLOGY/PARASITOLOGY	125	131	116	113	83	67	85	78	42	64	31	35
GENETICS	193	195	200	204	152	151	155	159	41	44	45	45
MICROBIOLOGY	604	678	773	843	449	504	591	623	155	174	182	220
NUTRITION	94	159	167	169	65	101	99	116	29	58	68	53
PATHOLOGY	320	389	482	533	237	291	366	375	83	98	116	158
PHARMACOLOGY	359	421	520	538	288	362	428	431	71	59	92	107
PHYSIOLOGY	481	521	573	604	371	415	472	472	110	106	101	132
ZOOLOGY	151	193	201	157	123	167	150	107	28	26	51	50
BIOSCIENCES, N.E.C.	86	117	126	134	49	72	84	91	37	45	42	43
HEALTH SCIENCES	5,033	4,804	5,519	6,282	3,197	2,937	3,165	3,240	1,836	1,867	2,354	3,042
ANESTHESIOLOGY	102	95	64	75	46	37	43	33	56	58	21	42
CARDIOLOGY	517	477	498	510	333	287	266	238	184	190	232	272
CLINICAL PHARMACOLOGY	56	59	43	79	35	43	32	53	21	16	11	26
DENTISTRY	36	36	104	366	9	16	47	62	27	20	57	304
ENDOCRINOLOGY	238	156	237	225	149	100	146	127	89	56	91	98
GASTROENTEROLOGY	200	184	171	201	141	101	88	96	59	83	83	105
HEMATOLOGY	236	202	276	261	156	144	180	172	80	58	96	89
NEUROLOGY	213	170	195	255	157	132	127	149	56	38	68	106
NURSING	0	16	1	0	0	16	1	0	0	0	0	0
OBSTETRICS/GYNECOLOGY	199	174	186	172	94	83	80	78	105	91	106	94
OPHTHALMOLOGY	92	104	163	186	50	64	108	132	42	40	55	54
OTORHINOLARYNGOLOGY	63	42	41	30	47	31	17	17	16	11	24	13
PEDIATRICS	581	492	554	580	364	298	322	290	217	194	232	290
PHARMACEUTICAL SCIENCES	181	200	198	235	155	174	163	171	26	26	35	64
PREVENTIVE MEDICINE/ COMMUNITY HEALTH	117	94	160	134	75	74	103	92	42	20	57	42
PSYCHIATRY	271	279	309	357	212	196	195	229	59	83	114	128
PULMONARY DISEASE	176	164	226	240	101	83	109	105	75	81	117	135
RADIOLOGY	123	160	162	175	79	115	140	100	44	45	22	75
SPEECH PATHOLOGY/AUDIOLOGY	13	13	16	30	13	9	14	17	0	4	2	13
SURGERY	315	329	402	449	188	184	208	212	127	145	194	237
VETERINARY SCIENCES	59	65	85	102	43	45	43	57	16	20	42	45
CLINICAL MEDICINE, N.E.C.	1,236	1,274	1,378	1,574	742	686	690	767	494	588	688	807
HEALTH RELATED, N.E.C.	9	19	50	46	8	19	43	43	1	0	7	3
PSYCHOLOGY	342	369	397	394	188	219	254	235	154	150	143	159
SOCIAL SCIENCES	424	293	347	394	211	146	163	186	213	147	184	208
AGRICULTURAL ECONOMICS	51	27	30	28	35	20	23	7	16	7	7	21
ANTHROPOLOGY	26	33	45	53	17	19	27	24	9	14	18	29
ECONOMICS (EXCEPT AGRICULTURAL)	68	44	57	66	38	15	14	13	30	29	43	53
GEOGRAPHY	22	7	12	9	7	2	1	4	15	5	11	5
HISTORY AND PHILOSOPHY OF SCIENCE	6	6	12	22	1	1	1	6	5	5	11	16
LINGUISTICS	49	25	35	30	13	12	11	7	36	13	24	23
POLITICAL SCIENCE	45	20	31	32	12	5	11	14	33	15	20	18
SOCIOLOGY	123	84	114	100	72	50	67	73	51	34	47	27
SOCIOLOGY/ANTHROPOLOGY	6	2	3	4	2	0	0	1	4	2	3	3
SOCIAL SCIENCES, N.E.C.	28	45	8	50	14	22	8	37	14	23	0	13

1/ DATA FOR 1978 ARE NOT AVAILABLE.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 61. RESEARCH ASSISTANTSHIPS IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD AND SOURCE OF SUPPORT: FALL 1974-77 1/

FIELD	TOTAL				FEDERAL				NON-FEDERAL			
	1974	1975	1976	1977	1974	1975	1976	1977	1974	1975	1976	1977
TOTAL	39,626	40,159	42,734	43,940	22,318	23,086	24,427	25,186	17,308	17,073	18,307	18,754
ENGINEERING	10,986	10,888	11,253	11,793	6,684	6,884	7,162	7,502	4,302	4,004	4,091	4,291
AERONAUTICAL	559	528	485	491	415	395	335	367	144	133	150	124
AGRICULTURAL	237	334	319	346	55	99	81	127	182	235	238	219
BIOMEDICAL	156	179	175	183	94	112	122	104	62	67	53	79
CHEMICAL	1,296	1,364	1,429	1,482	715	856	894	922	581	508	535	560
CIVIL	1,823	1,715	1,814	1,937	958	908	990	1,032	865	807	824	905
ELECTRICAL	2,156	2,159	2,127	2,412	1,617	1,674	1,640	1,810	539	485	487	602
ENGINEERING SCIENCE	619	601	600	506	463	436	411	302	156	165	189	204
INDUSTRIAL	680	544	526	501	321	241	196	230	359	303	330	271
MECHANICAL	1,458	1,414	1,599	1,611	836	900	1,074	1,080	622	514	525	531
METALLURGICAL/MATERIALS	1,063	1,111	1,147	1,188	775	793	858	868	288	318	289	320
MINING	132	111	128	130	79	70	93	89	53	41	35	41
NUCLEAR	407	473	471	508	164	191	216	248	243	282	255	260
PETROLEUM	70	73	83	99	11	12	19	41	59	61	64	58
ENGINEERING, N.E.C.	330	282	350	399	181	197	233	282	149	85	117	117
PHYSICAL SCIENCES	6,436	6,460	6,799	6,781	5,375	5,508	5,696	5,737	1,061	952	1,103	1,044
ASTRONOMY	227	211	211	197	187	174	181	158	40	37	30	39
CHEMISTRY	3,066	3,192	3,485	3,542	2,375	2,629	2,791	2,838	691	563	694	704
PHYSICS	3,099	3,016	3,076	3,017	2,795	2,690	2,716	2,726	304	326	360	291
PHYSICAL SCIENCES, N.E.C.	44	41	27	25	18	15	8	15	26	26	19	10
ENVIRONMENTAL SCIENCES	2,627	2,787	3,147	3,197	1,931	2,051	2,259	2,302	696	736	888	895
ATMOSPHERIC SCIENCES	404	466	488	497	333	378	444	466	71	88	44	31
GEOSCIENCES	1,284	1,330	1,594	1,599	922	979	1,083	1,136	362	351	511	463
OCEANOGRAPHY	821	850	896	905	595	627	630	615	226	223	266	290
ENVIRONMENTAL SCIENCES, N.E.C.	118	141	169	196	81	67	102	85	37	74	67	111
MATHEMATICAL SCIENCES	1,405	1,369	1,504	1,512	810	743	776	857	595	626	728	655
COMPUTER SCIENCE	728	732	782	802	456	441	410	494	272	291	372	308
MATHEMATICS AND APPLIED MATHEMATICS	390	374	434	400	210	205	245	222	180	169	189	178
STATISTICS	287	263	288	310	144	97	121	141	143	166	167	169
LIFE SCIENCES	10,931	11,426	12,715	13,160	5,068	5,441	6,117	6,204	5,863	5,985	6,598	6,956
AGRICULTURAL SCIENCES	3,786	4,065	4,305	4,402	1,274	1,439	1,468	1,491	2,512	2,626	2,837	2,911
BIOLOGICAL SCIENCES	6,356	6,573	7,471	7,744	3,408	3,578	4,199	4,228	2,948	2,995	3,272	3,516
ANATOMY	51	61	81	98	27	33	55	65	24	28	26	33
BIOCHEMISTRY	1,029	1,010	1,160	1,212	699	644	811	841	330	366	349	371
BIOLOGY	758	834	1,010	931	444	530	685	597	314	304	325	334
BIOMETRY/EPIDEMIOLOGY	57	61	73	85	35	45	48	56	22	16	25	29
BIOPHYSICS	135	182	184	173	99	136	139	131	36	46	45	42
BOTANY	667	677	767	843	239	265	287	334	428	412	480	509
CELL BIOLOGY	80	76	98	126	58	61	52	85	22	15	46	41
ECOLOGY	155	154	206	227	63	81	97	102	92	73	109	125
ENTOMOLOGY/PARASITOLOGY	608	655	659	664	233	238	245	236	375	417	414	428
GENETICS	137	137	157	162	64	86	84	78	73	51	73	84
MICROBIOLOGY	594	652	726	735	386	421	477	453	208	231	249	282
NUTRITION	779	687	800	912	319	285	345	342	460	402	455	570
PATHOLOGY	93	87	105	90	57	52	52	53	36	35	53	37
PHARMACOLOGY	239	282	293	311	132	162	160	170	107	120	133	141
PHYSIOLOGY	247	296	346	420	131	148	174	235	116	148	172	185
ZOOLOGY	501	484	492	443	284	261	300	245	217	223	192	198
BIOSCIENCES, N.E.C.	226	238	314	312	138	130	188	205	88	108	126	107
HEALTH SCIENCES	789	788	939	1,014	386	424	450	485	403	364	489	529
ANESTHESIOLOGY	0	0	1	0	0	0	1	0	0	0	0	0
CARDIOLOGY	1	1	0	0	1	1	0	0	0	0	0	0
CLINICAL PHARMACOLOGY	0	0	0	0	0	0	0	0	0	0	0	0
DENTISTRY	0	18	35	14	0	5	12	5	0	13	23	9
ENDOCRINOLOGY	2	6	2	3	2	3	2	3	0	3	0	0
GASTROENTEROLOGY	1	0	0	0	1	0	0	0	0	0	0	0
HEMATOLOGY	1	0	1	4	1	0	0	0	0	0	1	4
NEUROLOGY	23	34	18	29	19	28	12	18	4	6	6	11
NURSING	22	13	10	28	13	1	1	11	9	12	9	17
OBSTETRICS/GYNECOLOGY	3	11	14	7	0	8	14	6	3	3	0	1
OPHTHALMOLOGY	10	0	0	1	5	0	0	0	5	0	0	1
OTORHINOLARYNGOLOGY	5	2	7	6	5	2	5	5	0	0	2	1
PEDIATRICS	13	7	7	2	11	6	7	2	2	1	0	0
PHARMACEUTICAL SCIENCES	188	171	208	243	101	99	141	148	87	72	67	95
PREVENTIVE MEDICINE/ COMMUNITY HEALTH	66	84	111	100	43	41	55	55	23	43	56	45
PSYCHIATRY	10	6	2	1	1	6	1	0	9	0	1	1
PULMONARY DISEASE	3	0	0	0	1	0	0	0	2	0	0	0
RADIOLOGY	42	64	77	52	30	49	48	36	12	15	29	16
SPEECH PATHOLOGY/AUDIOLOGY	150	125	163	184	62	56	51	71	88	69	112	113
SURGERY	12	4	10	9	10	1	8	9	2	3	2	0
VETERINARY SCIENCES	133	143	183	253	32	59	51	76	101	84	132	177
CLINICAL MEDICINE, N.E.C.	47	22	37	27	32	17	17	16	15	5	20	11
HEALTH RELATED, N.E.C.	57	77	53	51	16	42	24	24	41	35	29	27
PSYCHOLOGY	2,289	2,208	2,244	2,293	1,042	1,004	970	1,029	1,247	1,204	1,274	1,264
SOCIAL SCIENCES	4,952	5,021	5,072	5,204	1,408	1,455	1,447	1,555	3,544	3,566	3,625	3,649
AGRICULTURAL ECONOMICS	816	893	880	959	271	299	282	357	545	594	598	602
ANTHROPOLOGY	350	378	339	392	110	156	118	114	240	222	221	278
ECONOMICS (EXCEPT AGRICULTURAL)	1,108	1,097	1,121	1,099	286	292	229	269	822	805	892	830
GEOGRAPHY	217	218	241	230	85	58	79	66	132	160	162	164
HISTORY AND PHILOSOPHY OF SCIENCE	9	2	10	12	0	0	3	5	9	2	7	7
LINGUISTICS	180	140	182	155	91	69	117	92	89	71	65	63
POLITICAL SCIENCE	874	869	863	780	97	94	108	101	777	775	755	679
SOCIOLOGY	986	925	1,015	1,043	315	339	351	355	671	586	664	688
SOCIOLOGY/ANTHROPOLOGY	110	155	98	98	33	43	27	25	77	112	71	73
SOCIAL SCIENCES, N.E.C.	302	344	323	436	120	105	133	171	182	239	190	265

1/ DATA FOR 1978 ARE NOT AVAILABLE.
SOURCE: NATIONAL SCIENCE FOUNDATION

Table 62. Full-time-equivalent R&D scientists and engineers employed in universities and colleges: 1969, and 1972–79

Year	Number of FTE's in R&D
1969	50,400
1972	48,900
1973	46,900
1974	48,000
1975	51,600
1976	52,900
1977	54,400
1978	55,200
1979	54,300
	Average annual rate of change
1969-73	−1.8
1973-74	2.3
1974-75	7.5
1975-76	2.5
1976-77	2.8
1977-78	1.5
1978-79	−1.7

SOURCE: National Science Foundation

Table 63. Full-time-equivalent R&D scientists and engineers at universities and colleges by field: 1969 and 1979

Field	1969	1979
	50,400	54,293
Engineers	5,654	6,188
Physical scientists	7,830	6,635
Environmental scientists	(1)	2,906
Mathematical and computer scientists	1,899	1,890
Life scientists	29,274	31,150
Psychologists	1,427	1,570
Social scientists	4,316	3,954

[1] Included with physical scientists.

SOURCE: National Science Foundation

TABLE 64. FULL-TIME-EQUIVALENT SCIENTISTS AND ENGINEERS EMPLOYED IN UNIVERSITIES AND COLLEGES BY FIELD AND TYPE OF ACTIVITY: 1978-79

FIELD	TOTAL FTE'S		R&D FTE'S 1/	
	1978	1979 2/	1978	1979 2/
TOTAL	271,130	274,647	55,234	54,293
ENGINEERS	27,497	27,718	5,817	6,188
AERONAUTICAL & ASTRONAUTICAL ENGINEERS	1,025	994	290	265
CHEMICAL ENGINEERS	1,875	1,941	454	517
CIVIL ENGINEERS	4,726	4,706	692	714
ELECTRICAL ENGINEERS	6,270	6,142	1,319	1,208
MECHANICAL ENGINEERS	5,012	5,003	815	861
OTHER ENGINEERS	8,589	8,932	2,247	2,623
PHYSICAL SCIENTISTS	30,579	30,103	6,976	6,635
CHEMISTS	16,382	16,101	3,273	3,254
PHYSICISTS	12,076	11,862	2,797	2,607
ASTRONOMERS 3/	0	651	0	283
OTHER PHYSICAL SCIENTISTS	2,121	1,489	905	491
ENVIRONMENTAL SCIENTISTS	8,839	8,907	2,522	2,906
EARTH SCIENTISTS	6,489	6,188	1,360	1,287
ATMOSPHERIC SCIENTISTS	881	902	435	463
OCEANOGRAPHERS	1,469	1,664	730	1,104
OTHER ENVIRONMENTAL SCIENTISTS 3/	0	153	0	55
MATHEMATICAL AND COMPUTER SCIENTISTS	28,175	28,703	2,411	1,890
MATHEMATICIANS	22,437	22,536	1,569	1,143
COMPUTER SCIENTISTS (EXCLUDING PROGRAMMERS)	5,738	6,167	841	747
LIFE SCIENTISTS	108,618	112,118	30,768	31,150
AGRICULTURAL SCIENTISTS	14,261	14,855	4,440	5,480
BIOLOGICAL SCIENTISTS	40,591	41,394	12,219	12,171
MEDICAL SCIENTISTS	53,766	53,305	14,108	13,074
OTHER LIFE SCIENTISTS 3/	0	2,564	0	422
PSYCHOLOGISTS	20,166	19,781	1,984	1,570
SOCIAL SCIENTISTS	47,256	47,317	4,757	3,954
ECONOMISTS	12,257	12,395	1,611	1,384
SOCIOLOGISTS	13,175	13,114	1,075	903
POLITICAL SCIENTISTS	10,124	10,154	729	612
OTHER SOCIAL SCIENTISTS	11,700	11,654	1,342	1,056

1/ DETAILS MAY NOT ADD TO TOTALS BECAUSE OF ROUNDING.
2/ ESTIMATED, BASED ON DATA COLLECTED FROM DOCTORATE-GRANTING INSTITUTIONS ONLY.
3/ DATA NOT AVAILABLE FOR 1978.
NOTE: DATA FOR EARLIER YEARS ARE NOT AVAILABLE.
SOURCE: NATIONAL SCIENCE FOUNDATION

TABLE 65. FULL-TIME-EQUIVALENT SCIENTISTS AND ENGINEERS EMPLOYED IN DOCTORATE-GRANTING INSTITUTIONS BY FIELD AND TYPE OF ACTIVITY: 1978-79

FIELD	TOTAL FTE'S		R&D FTE'S 1/	
	1978	1979	1978	1979
TOTAL	180,736	184,253	53,317	52,376
ENGINEERS	20,059	20,280	5,656	6,027
AERONAUTICAL & ASTRONAUTICAL ENGINEERS	779	748	278	253
CHEMICAL ENGINEERS	1,655	1,721	451	514
CIVIL ENGINEERS	3,339	3,319	674	696
ELECTRICAL ENGINEERS	4,142	4,014	1,262	1,151
MECHANICAL ENGINEERS	3,338	3,329	783	829
OTHER ENGINEERS	6,806	7,149	2,208	2,584
PHYSICAL SCIENTISTS	17,398	16,922	6,619	6,278
CHEMISTS	8,661	8,380	3,047	3,028
PHYSICISTS	7,356	7,142	2,674	2,484
ASTRONOMERS 2/	0	651	0	283
OTHER PHYSICAL SCIENTISTS	1,381	749	897	483
ENVIRONMENTAL SCIENTISTS	6,087	6,155	2,429	2,813
EARTH SCIENTISTS	4,020	3,719	1,294	1,221
ATMOSPHERIC SCIENTISTS	768	789	430	458
OCEANOGRAPHERS	1,299	1,494	706	1,080
OTHER ENVIRONMENTAL SCIENTISTS 2/	0	153	0	55
MATHEMATICAL AND COMPUTER SCIENTISTS	12,149	12,677	2,191	1,670
MATHEMATICIANS	9,319	9,418	1,430	1,004
COMPUTER SCIENTISTS (EXCLUDING PROGRAMMERS)	2,830	3,259	759	665
LIFE SCIENTISTS	91,355	94,855	30,208	30,590
AGRICULTURAL SCIENTISTS	12,302	12,896	4,346	5,386
BIOLOGICAL SCIENTISTS	28,047	28,850	11,873	11,825
MEDICAL SCIENTISTS	51,006	50,545	13,990	12,956
OTHER LIFE SCIENTISTS 2/	0	2,564	0	422
PSYCHOLOGISTS	8,926	8,541	1,816	1,402
SOCIAL SCIENTISTS	24,762	24,823	4,399	3,596
ECONOMISTS	6,882	7,020	1,529	1,302
SOCIOLOGISTS	5,953	5,892	968	796
POLITICAL SCIENTISTS	4,818	4,848	651	534
OTHER SOCIAL SCIENTISTS	7,109	7,063	1,251	965

1/ DETAILS MAY NOT ADD TO TOTALS BECAUSE OF ROUNDING.
2/ DATA NOT AVAILABLE FOR 1978.
NOTE: DATA FOR EARLIER YEARS ARE NOT AVAILABLE.
SOURCE: NATIONAL SCIENCE FOUNDATION

Table 66. Scientists and engineers by field, employment status, and sex: 1974, 1976, and 1978

Field	Total			Total labor force			Outside labor force		
	1974	1976	1978	1974	1976	1978	1974	1976	1978
Total, all fields	2,481,800	2,705,800	2,741,400	2,288,000	2,451,700	2,507,600	193,800	254,100	233,800
Men	2,265,000	2,455,800	2,475,300	2,104,700	2,240,000	2,270,400	160,300	215,800	204,900
Women	216,800	250,000	266,100	183,300	211,700	237,200	33,500	38,300	28,900
Physical scientists	247,900	280,600	254,600	206,500	237,300	216,700	41,400	43,300	37,900
Men	227,200	254,100	231,800	189,900	215,800	200,700	37,300	38,300	31,100
Women	20,700	26,500	22,800	16,600	21,500	16,000	4,100	5,100	6,800
Mathematical scientists	101,000	110,200	107,800	84,500	92,200	89,800	16,500	18,000	18,000
Men	81,000	87,200	88,000	70,600	76,000	71,800	10,400	11,200	16,200
Women	20,000	22,900	19,800	13,900	16,200	18,000	6,100	6,800	1,800
Computer specialists	170,000	179,900	237,500	167,100	173,500	234,600	2,900	6,400	2,900
Men	135,400	143,500	194,800	135,400	139,500	193,900	(1)	4,000	900
Women	34,600	36,400	42,700	31,700	34,000	40,600	2,900	2,400	2,100
Environmental scientists	79,000	85,700	80,800	71,500	77,400	73,900	7,500	8,300	6,900
Men	73,700	79,300	72,200	67,100	73,000	66,200	6,600	6,300	6,000
Women	5,300	6,400	8,600	4,400	4,400	7,800	900	2,000	900
Engineers	1,291,600	1,375,200	1,396,400	1,228,600	1,268,000	1,285,000	63,000	107,200	111,300
Men	1,284,900	1,366,900	1,374,600	1,224,200	1,261,000	1,264,500	60,700	105,900	110,100
Women	6,700	8,300	21,700	4,400	7,000	20,500	2,300	1,300	1,200
Life scientists	266,000	314,100	327,600	243,400	286,300	295,800	22,600	27,800	31,800
Men	214,100	253,300	255,400	197,400	232,700	231,500	16,700	20,600	23,900
Women	51,900	60,800	72,200	46,000	53,700	64,300	5,900	7,200	7,900
Psychologists	109,300	122,900	131,700	94,000	105,700	123,200	15,300	17,200	8,500
Men	84,200	92,300	95,700	73,000	80,000	91,100	11,200	12,300	4,600
Women	25,100	30,700	36,000	21,000	25,700	32,100	4,100	4,900	3,900
Social scientists	217,000	237,200	205,100	192,400	211,400	188,500	24,600	25,600	16,600
Men	164,000	179,200	162,800	147,100	162,100	150,600	16,900	17,100	12,200
Women	53,000	58,000	42,200	45,300	49,300	37,800	7,700	8,600	4,400

[1] Too few cases to estimate.

NOTE: Detail may not add to total because of rounding.

SOURCE: National Science Foundation

Table 67. Scientists and engineers by field, labor force status, and sex: 1974, 1976, and 1978

Field	Total employed			In S/E			Outside S/E			Unemployed but seeking employment		
	1974	1976	1978	1974	1976	1978	1974	1976	1978	1974	1976	1978
Total, all fields	2,248,200	2,377,200	2,473,200	NA	2,090,300	2,091,900	NA	286,800	381,300	39,800	74,600	34,400
Men	2,072,100	2,199,900	2,241,700	NA	1,914,500	1,914,400	NA	265,600	284,300	32,600	60,100	28,700
Women	176,100	197,200	231,500	NA	175,900	175,900	NA	21,300	97,000	7,200	14,500	5,700
Physical scientists	201,400	227,400	212,400	NA	189,400	184,700	NA	38,000	27,600	5,100	9,900	4,300
Men	185,500	207,500	197,400	NA	176,400	174,400	NA	31,100	22,900	4,400	8,400	3,400
Women	15,900	19,900	15,000	NA	13,100	10,300	NA	6,900	4,700	700	1,500	1,000
Mathematical scientists	82,800	88,300	88,400	NA	85,700	42,900	NA	2,600	45,600	1,700	3,900	1,400
Men	69,300	72,700	70,900	NA	70,300	38,100	NA	2,300	32,700	1,300	3,300	900
Women	13,500	15,600	17,500	NA	15,300	4,800	NA	300	12,800	400	500	500
Computer specialists	166,200	172,300	234,000	NA	167,200	231,400	NA	5,200	2,500	900	1,200	600
Men	134,900	138,700	193,400	NA	134,400	191,100	NA	4,300	2,200	500	800	600
Women	31,300	33,600	40,600	NA	32,700	40,300	NA	900	300	400	400	100
Environmental scientists	69,100	74,800	72,200	NA	52,000	62,400	NA	22,900	9,900	2,400	2,600	1,700
Men	64,800	71,100	64,600	NA	49,900	57,500	NA	21,200	7,100	2,300	1,800	1,600
Women	4,300	3,700	7,700	NA	2,100	5,000	NA	1,600	2,700	100	700	100
Engineers	1,212,600	1,240,700	1,268,400	NA	1,123,400	1,201,200	NA	117,300	67,200	16,000	27,200	16,700
Men	1,208,300	1,234,000	1,248,500	NA	1,117,600	1,183,400	NA	116,500	65,100	15,900	26,900	16,000
Women	4,300	6,700	19,800	NA	5,800	17,800	NA	900	2,100	100	300	700
Life scientists	238,600	277,500	291,000	NA	224,900	201,800	NA	52,600	89,100	4,800	8,800	4,900
Men	193,400	226,000	227,800	NA	176,400	165,600	NA	49,600	62,100	4,000	6,600	3,800
Women	45,200	51,400	63,200	NA	48,500	36,200	NA	2,900	26,900	800	2,200	1,200
Psychologists	89,600	97,800	120,900	NA	84,200	71,200	NA	13,500	49,700	4,400	8,000	2,300
Men	71,500	76,700	89,700	NA	64,600	58,200	NA	12,100	31,500	1,500	3,300	1,400
Women	18,100	21,100	31,200	NA	19,700	13,100	NA	1,400	18,200	2,900	4,700	900
Social scientists	187,900	198,300	186,000	NA	163,600	96,200	NA	34,700	89,800	4,500	13,100	2,500
Men	144,500	153,200	149,500	NA	124,900	89,000	NA	28,300	60,500	2,700	9,000	1,100
Women	43,400	45,200	36,400	NA	38,700	7,200	NA	6,400	29,300	1,800	4,200	1,400

NA: Not available

NOTE: Detail may not add to total because of rounding.

SOURCE: National Science Foundation

Table 68. Scientists and engineers by field, sex, and type of employer: 1974, 1976, and 1978

Field	Total			Business & industry			Educational institutions			Federal Government			All other[1]		
	1974	1976	1978	1974	1976	1978	1974	1976	1978	1974	1976	1978	1974	1976	1978
Total, all fields	2,248,200	2,377,200	2,473,200	1,376,200	1,433,100	1,528,100	341,300	370,700	380,800	189,100	205,600	205,800	341,500	367,800	358,400
Men	2,072,100	2,179,900	2,241,700	1,313,800	1,362,600	1,445,300	288,200	312,100	304,800	175,500	189,700	187,300	294,500	315,600	304,600
Women	176,100	197,200	231,500	62,400	70,500	82,700	53,100	58,600	76,000	13,600	15,900	18,600	47,000	52,200	54,000
Physical scientists	201,400	227,400	212,400	98,000	106,700	116,300	47,400	54,100	55,500	19,600	22,800	18,000	36,400	41,700	22,600
Men	185,500	207,500	197,400	89,300	99,000	108,400	44,200	49,400	51,500	18,800	21,100	16,900	33,200	38,000	20,500
Women	15,900	19,900	15,000	8,700	9,700	7,900	3,200	4,700	4,000	800	1,800	1,100	3,200	3,900	2,100
Mathematical scientists	82,800	88,300	88,400	32,000	33,600	34,200	31,900	34,600	35,100	7,900	8,700	9,400	11,000	11,300	9,700
Men	69,300	72,700	70,900	27,000	27,900	25,600	28,100	29,800	28,600	6,100	6,600	8,800	8,100	8,400	7,800
Women	13,500	15,600	17,500	5,000	5,700	8,600	3,800	4,800	6,500	1,800	2,100	600	2,900	3,000	1,800
Computer specialists	166,200	172,300	233,900	121,600	125,900	173,000	13,400	13,800	17,900	13,900	14,300	14,600	17,300	18,200	28,800
Men	134,900	138,700	193,400	99,100	101,600	145,100	10,600	10,900	13,900	11,300	11,600	12,300	13,900	14,600	22,300
Women	31,300	33,600	40,600	22,500	24,300	27,800	2,800	2,900	4,000	2,600	2,800	2,300	3,400	3,800	6,600
Environmental scientists	69,100	74,800	72,300	36,200	40,400	40,400	10,100	11,100	12,900	10,600	11,100	10,400	12,100	12,200	8,600
Men	64,800	71,100	64,600	34,800	38,900	36,000	9,100	10,500	11,300	9,600	10,500	9,500	11,200	11,200	7,900
Women	4,300	3,700	7,700	1,400	1,500	4,400	1,000	600	1,600	1,000	600	900	900	900	700
Engineers	1,212,600	1,240,700	1,268,400	939,600	959,700	985,400	43,100	43,900	48,700	95,100	97,500	90,600	134,800	139,500	143,700
Men	1,208,300	1,234,000	1,248,500	936,700	955,100	969,100	42,900	43,600	47,700	94,700	96,900	89,200	134,000	138,400	142,500
Women	4,300	6,700	19,800	2,900	4,600	16,300	200	300	900	400	700	1,400	800	1,100	1,200
Life scientists	238,600	277,500	291,000	89,500	102,000	86,400	75,300	86,100	94,400	17,900	25,600	41,800	55,900	63,700	68,200
Men	193,400	226,000	227,800	78,000	88,300	77,300	56,300	65,500	65,500	16,000	23,100	35,500	43,100	49,000	49,600
Women	45,200	51,400	63,200	11,500	13,700	9,100	19,000	20,700	28,900	1,900	2,500	6,400	12,800	14,600	18,800
Psychologists	89,600	97,800	120,900	17,700	18,700	31,600	39,300	42,900	55,300	5,100	5,400	4,000	27,500	30,700	29,900
Men	71,500	76,700	89,700	14,100	14,800	28,500	33,700	36,100	36,000	4,500	4,700	3,100	19,200	21,200	22,100
Women	18,100	21,100	31,200	3,600	3,900	3,000	5,600	6,700	19,400	600	700	900	8,300	9,600	7,900
Social Scientists	187,900	198,300	186,000	41,600	44,100	60,800	80,800	84,300	61,300	19,000	20,000	17,000	46,500	49,900	45,700
Men	144,500	153,200	149,500	34,800	37,000	55,300	63,300	66,300	50,200	14,500	15,300	12,000	31,800	34,600	31,900
Women	43,400	45,200	36,500	6,800	7,100	5,600	17,500	17,900	11,100	4,500	4,700	5,000	14,700	15,400	14,900

[1] Includes nonprofit organizations; military; State, local, and other government; other and no report.

NOTE: Detail may not add to total because of rounding.

SOURCE: National Science Foundation

Table 69. Scientists and engineers by field, sex, and primary work activity: 1974, 1976, and 1978

Field	Total			Research			Development			Management[1]			Teaching			Other[2]		
	1974	1976	1978	1974	1976	1978	1974	1976	1978	1974	1976	1978	1974	1976	1978	1974	1976	1978
Total, all fields	2,248,200	2,377,200	2,473,200	210,400	231,700	278,000	380,500	396,400	407,300	544,800	573,400	623,100	223,700	237,100	225,200	888,900	938,700	940,000
Men	2,072,100	2,179,900	2,241,700	180,500	197,600	230,600	371,500	386,100	393,500	520,500	546,600	596,000	188,800	202,300	179,900	811,000	847,600	841,700
Women	176,100	197,200	231,500	29,800	34,100	47,300	9,000	10,100	13,800	24,300	26,800	26,900	34,800	34,800	45,200	78,000	91,300	98,300
Physical scientists	201,400	227,400	212,400	54,400	62,700	66,500	24,500	27,600	28,000	31,200	36,200	45,600	29,800	32,900	25,800	61,500	67,900	46,500
Men	185,500	207,500	197,400	48,900	55,400	59,700	22,900	25,900	26,400	30,500	35,000	44,300	27,900	31,000	24,400	55,300	60,200	42,600
Women	15,900	19,900	15,000	5,500	7,400	6,800	1,600	1,800	1,600	700	1,200	1,300	1,900	1,900	1,400	6,200	7,700	3,900
Mathematical scientists	82,800	88,300	88,400	4,800	5,500	12,700	6,200	6,700	3,600	11,400	12,400	15,400	25,000	28,200	29,300	35,400	35,500	27,600
Men	69,300	72,700	70,900	4,400	5,000	10,400	6,000	6,300	3,600	9,200	9,800	14,600	20,900	23,600	25,600	28,800	28,000	16,800
Women	13,500	15,600	17,500	400	500	2,300	200	400	([3])	2,200	2,600	800	4,100	4,700	3,700	6,600	7,500	10,800
Computer specialists	166,200	172,300	233,900	2,300	2,300	5,700	20,900	21,300	28,200	27,300	27,900	34,300	2,600	2,700	6,700	113,100	118,200	159,000
Men	134,900	138,700	193,400	1,900	2,000	5,300	17,300	17,500	23,700	23,600	24,000	31,700	2,200	2,300	5,600	89,900	92,900	127,100
Women	31,300	33,600	46,600	400	400	600	3,800	3,700	4,400	3,700	3,800	2,600	400	400	1,100	23,200	25,400	31,900
Environmental scientists	69,100	74,800	72,300	14,900	15,900	20,600	2,700	2,800	5,500	12,100	13,500	11,600	6,500	6,500	6,300	33,000	36,200	28,400
Men	64,800	71,100	64,600	13,300	14,700	17,700	2,500	2,700	5,300	11,900	13,200	11,200	6,000	6,100	5,900	31,100	34,400	24,400
Women	4,300	3,700	7,700	1,500	1,300	2,800	200	100	200	200	200	400	400	300	400	2,000	1,800	3,900
Engineers	1,212,600	1,240,700	1,268,400	48,300	49,500	50,300	319,900	328,100	327,800	362,600	369,800	372,600	31,300	31,800	25,100	450,500	461,600	492,700
Men	1,208,300	1,234,000	1,248,500	47,900	48,800	48,300	318,200	325,900	323,700	361,900	369,000	370,600	31,300	31,800	25,000	449,000	458,700	481,100
Women	4,300	6,700	19,800	400	600	2,000	1,700	2,200	4,200	700	800	2,000	([3])	([3])	100	1,400	2,800	11,600
Life scientists	238,600	277,500	291,000	59,400	67,600	89,400	2,400	4,800	9,300	39,300	49,100	69,800	42,700	46,600	56,100	94,800	110,000	66,500
Men	193,400	226,000	227,800	43,400	49,500	63,900	2,000	4,200	6,800	33,700	42,700	61,600	32,700	37,000	37,500	81,700	92,800	57,900
Women	45,200	51,400	63,200	16,000	17,600	25,300	400	600	2,500	5,600	6,400	8,300	10,000	9,700	18,500	13,100	17,200	8,500
Psychologists	89,600	97,800	120,900	8,300	9,200	11,400	([3])	400	500	13,400	14,700	20,500	22,400	23,500	29,100	45,500	50,000	59,400
Men	71,500	76,700	89,700	6,300	6,800	8,200	([3])	300	300	11,200	12,200	16,000	18,300	19,400	17,600	35,700	38,000	47,600
Women	18,100	21,100	31,200	2,000	2,400	3,200	([3])	100	200	2,200	2,500	4,400	4,100	4,100	11,500	9,800	12,000	11,800
Social scientists	187,900	198,300	186,000	18,000	19,400	21,600	3,900	4,700	4,400	47,500	50,000	53,300	62,700	64,900	46,900	55,800	59,300	60,000
Men	144,400	153,200	149,500	14,400	15,400	17,200	2,600	3,400	3,700	38,500	40,700	46,000	49,500	51,300	38,300	39,500	42,200	44,300
Women	43,500	45,200	36,500	3,600	4,000	4,400	1,300	1,300	700	9,000	9,300	7,300	13,200	13,600	8,600	16,300	17,000	15,400

[1] Includes management of R&D.

[2] Includes consulting; production/inspection; reporting, statistical work, computing; other activities and no report.

[3] Too few cases to estimate.

NOTE: Detail may not add to total because of rounding.

SOURCE: National Science Foundation

Table 70. Scientists and engineers by field, employment status, and race: 1974, 1976, and 1978

Field	Total					Total labor force					Outside labor force				
	Total	White	Black	Asian	Other[1]	Total	White	Black	Asian	Other[1]	Total	White	Black	Asian	Other[1]
	1974														
Total, all fields	2,481,800	2,375,600	38,500	43,900	23,800	2,288,000	2,188,500	35,500	41,200	22,800	193,800	187,100	3,000	2,700	1,000
Physical scientists	247,900	235,400	4,100	6,200	2,100	206,500	195,000	4,100	6,000	1,400	41,400	40,400	(2)	200	800
Mathematical scientists	101,000	96,700	2,500	1,500	400	84,500	80,600	2,200	1,300	400	16,500	16,100	300	200	(2)
Computer specialists	170,000	162,500	3,300	3,500	700	167,100	160,000	3,000	3,400	700	2,900	2,500	300	100	(2)
Environmental scientists	79,000	77,300	200	700	700	71,500	70,000	200	700	600	7,500	7,300	(2)	(2)	100
Engineers	1,291,600	1,246,700	11,800	22,300	10,800	1,228,600	1,184,900	10,900	22,000	10,800	63,000	61,800	900	300	(2)
Life scientists	266,000	255,700	3,200	3,700	3,400	243,400	233,900	2,700	3,400	3,400	22,600	21,800	500	300	(2)
Psychologists	109,300	103,500	1,800	3,000	1,000	94,000	88,800	1,700	2,500	1,000	15,300	14,700	100	500	(2)
Social scientists	217,000	197,800	11,600	3,000	4,600	192,400	175,400	10,700	1,900	4,400	24,600	22,400	900	1,100	200
	1976														
Total, all fields	2,705,800	2,593,600	40,400	45,400	26,400	2,451,700	2,348,200	36,000	42,600	24,800	254,100	245,400	4,400	2,800	1,600
Physical scientists	280,600	266,300	4,400	5,900	4,000	237,200	224,800	3,400	5,600	3,600	43,300	41,500	1,000	300	500
Mathematical scientists	110,200	105,300	2,700	1,600	500	92,200	88,000	2,400	1,200	500	18,000	17,300	300	400	(2)
Computer specialists	179,900	171,800	3,700	3,700	800	173,500	165,400	3,700	3,600	800	6,400	6,400	(2)	(2)	(2)
Environmental scientists	85,700	84,600	100	500	500	77,400	76,300	100	500	500	8,300	8,300	(2)	(2)	(2)
Engineers	1,375,200	1,327,300	12,600	23,000	12,400	1,268,000	1,222,400	12,200	21,400	12,100	107,200	104,900	400	1,600	300
Life scientists	314,100	302,100	3,600	4,100	4,200	286,300	275,600	3,000	3,900	3,800	27,800	26,500	600	300	400
Psychologists	122,900	116,900	1,600	3,300	1,100	105,700	100,100	1,500	3,200	1,100	17,200	16,800	200	100	100
Social scientists	237,200	219,400	11,600	3,400	2,800	211,400	195,700	9,800	3,300	2,600	25,600	23,700	1,800	100	100
	1978														
Total, all fields	2,741,400	2,621,200	41,800	53,700	24,700	2,507,600	2,393,000	39,600	51,300	23,200	233,800	227,600	2,200	2,500	1,500
Physical scientists	254,600	243,300	3,700	5,700	1,900	216,700	206,800	3,200	5,300	1,400	37,900	36,500	500	400	500
Mathematical scientists	107,800	101,300	3,000	2,000	1,400	89,800	83,900	2,900	1,800	1,200	18,000	17,400	100	100	200
Computer specialists	237,500	229,100	1,400	6,900	100	234,600	226,300	1,300	6,900	100	2,900	2,800	100	100	(2)
Environmental scientists	80,800	78,900	700	600	500	73,900	72,200	700	600	500	6,900	6,700	(2)	100	100
Engineers	1,396,400	1,344,000	11,400	27,000	13,900	1,285,000	1,234,400	10,600	26,400	13,600	111,300	109,600	800	700	300
Life scientists	327,600	313,100	6,700	5,900	1,900	295,800	282,400	6,600	5,200	1,600	31,800	30,700	100	700	200
Psychologists	131,700	127,000	3,700	100	800	123,200	119,000	3,500	(2)	700	8,500	8,000	300	200	(2)
Social scientists	205,100	184,600	11,000	5,400	4,000	188,500	168,700	10,700	5,100	4,000	16,600	15,900	300	300	100

[1] Includes American Indians, other, and no report.

[2] Too few cases to estimate.

NOTE: Detail may not add to total because of rounding.

SOURCE: National Science Foundation

Table 71. Selected characteristics of employed doctoral scientists and engineers in the U.S.

Characteristics	1973			1975			1977		
	Number	Percent	Median annual salary	Number	Percent	Median annual salary	Number	Percent	Median annual salary
Total	220,410	100.00	$20,700	256,048	100.00	$23,200	284,237	100.0	$25,600
Field:									
Physical scientists	48,466	22.0	21,000	54,638	21.3	23,900	57,450	20.2	26,600
Chemists	30,704	13.9	21,000	35,812	14.0	24,000	37,314	13.1	26,600
Physicists/astronomers	17,762	8.1	21,000	18,826	7.4	23,700	20,136	7.1	26,500
Mathematical scientists	12,145	5.5	19,200	13,639	5.3	21,200	14,573	5.1	23,300
Mathematicians	10,686	4.8	19,000	11,898	4.6	20,900	12,860	4.5	23,100
Statisticians	1,459	.7	20,900	1,741	.7	23,100	1,713	.6	25,100
Computer specialists	2,692	1.2	21,700	3,496	1.4	23,500	5,767	2.0	25,800
Environmental scientists	10,329	4.7	20,700	12,126	4.7	23,500	13,026	4.6	25,800
Earth scientists	8,534	3.9	20,700	9,531	3.7	23,600	9,765	3.4	25,900
Oceanographers	1,157	.5	19,800	1,277	.5	22,200	1,563	.5	24,100
Atmospheric scientists	638	.3	22,500	1,318	.5	24,200	1,698	.6	28,300
Engineers	35,775	16.2	22,300	42,410	16.6	25,200	45,046	15.8	28,600
Life scientists	58,047	26.3	20,100	65,184	25.5	22,300	71,924	25.3	24,700
Biological scientists	36,859	16.7	19,400	39,076	15.3	21,300	42,161	14.8	23,800
Agricultural scientists	10,553	4.8	19,900	12,924	5.0	22,100	14,293	5.0	24,800
Medical scientists	10,635	4.8	22,700	13,184	5.1	25,700	15,470	5.4	28,000
Psychologists	24,850	11.3	20,200	30,073	11.7	22,100	33,724	11.9	24,100
Social scientists	28,106	12.8	20,300	34,482	13.5	22,100	42,727	15.0	24,100
Economists	8,289	3.8	22,300	9,888	3.9	24,500	10,790	3.8	27,000
Sociologists/anthropologists	6,530	3.0	19,300	7,930	3.1	20,700	9,493	3.3	22,200
Other social scientists	13,287	6.0	19,500	16,664	6.5	21,100	22,444	7.9	23,200
Sex:									
Men	203,452	92.3	21,000	233,935	91.4	23,500	256,735	90.3	26,000
Women	16,958	7.7	17,400	22,113	8.6	19,000	27,502	9.7	20,700
Race:									
White	200,691	91.1	21,000	229,322	89.6	23,200	253,309	89.1	25,700
Black	2,034	.9	21,200	2,474	1.0	22,800	2,744	1.0	23,800
Am. Indian	340	.2	(1)	435	.2	20,800	597	.2	23,900
Asian	8,989	4.1	20,000	12,577	4.9	21,500	15,242	5.4	23,800
No report	8,356	3.8	20,[illegible]00	11,240	4.4	23,100	12,345	4.3	25,700
Age:									
Under 30	9,669	4.4	15,400	9,528	3.7	16,900	8,474	3.0	18,500
30-34	49,726	22.6	17,300	55,217	21.6	18,800	53,562	18.8	20,400
35-39	42,064	19.1	19,600	53,516	20.9	21,500	66,741	23.5	23,600
40-44	35,304	16.0	21,800	40,044	15.6	24,200	45,147	15.9	26,500
45-49	29,945	13.6	24,100	33,640	13.1	26,200	37,626	13.2	29,200
50-54	24,109	10.9	24,900	28,675	11.2	28,100	30,935	10.9	30,900
55-59	15,579	7.1	25,200	18,435	7.2	28,200	22,507	7.9	31,600
60-64	8,982	4.1	25,500	11,255	4.4	28,500	12,944	4.6	31,400
65 & over	4,876	2.2	24,700	5,476	2.1	(2)	5,974	2.1	31,200
No report	156	.1	24,300	262	.1	24,200	327	.1	26,600
Sector of employment:									
Business & industry	53,403	24.2	23,300	64,630	25.2	26,000	71,464	25.1	29,900
Educational institutions	129,408	58.7	19,100	149,184	58.3	21,400	163,101	57.4	23,700
4-year coll./univ.	124,901	56.7	19,200	143,701	56.1	21,500	156,452	55.0	23,800
2-year college	2,962	1.3	17,800	3,567	1.4	19,100	4,634	1.6	20,900
Elem./sec. school	1,545	.7	19,300	1,916	.7	20,500	2,015	.7	22,400
Hospital/clinic	4,543	2.1	19,400	7,469	2.9	21,800	8,587	3.0	23,600
Nonprofit organizations	8,006	3.6	21,700	8,337	3.3	24,400	10,188	3.6	26,800
Federal Government	18,200	8.3	23,500	18,995	7.4	26,300	21,353	7.5	29,700
Military/Commissioned Corps	1,977	.9	(2)	2,130	.8	(2)	2,282	.8	(2)
State government	3,001	1.4	19,500	3,015	1.2	20,900	3,783	1.3	21,600
Other government	1,255	.6	19,000	1,860	.7	22,900	1,545	.5	22,100
Other	331	.2	21,100	82	(3)	(1)	57[illegible]	.2	37,500
No report	286	.1	(1)	326	.1	(1)	1,360	.5	(1)
Primary work activity:									
Research and development	71,460	32.4	20,600	82,360	32.2	23,000	93,460	32.9	25,600
Basic research	34,258	15.5	19,900	38,144	14.9	22,200	43,545	15.3	24,600
Applied research	28,700	13.0	21,000	32,885	12.8	23,300	36,413	12.8	26,300
Development	8,502	3.9	21,100	11,331	4.4	23,600	13,502	4.8	26,100
Management or administration	46,172	20.9	26,700	51,778	20.2	29,500	60,464	21.3	31,900
Of R&D	26,223	11.9	27,000	28,669	11.2	30,100	30,733	10.8	33,100
Other than R&D	13,258	6.0	25,700	15,720	6.1	27,800	22,150	7.8	30,200
Of both	6,691	3.0	27,500	7,389	2.9	30,200	7,581	2.7	32,200
Teaching	80,012	36.3	18,900	91,159	35.6	20,600	90,392	31.8	22,600
Consulting	4,055	1.8	23,200	5,516	2.2	25,400	6,141	2.2	28,200
Sales/professional services	8,064	3.7	20,700	11,872	4.6	21,900	15,183	5.3	24,700
Other	6,959	3.2	(2)	7,485	2.9	22,100	12,785	4.5	24,900
No report	3,688	1.7	21,400	6,078	2.4	23,700	5,812	2.0	25,400

[1] No median computed for groups with fewer than 20 individuals reporting salary.
[2] Data not available.
[3] Less than .05 percent.

NOTE. Percents may not add to 100 because of rounding. Median salaries computed for full-time employed civilians only.
SOURCE: National Science Foundation

Table 72. Employed doctoral scientists and engineers by field and type of employer: 1973, 1975, and 1977

Field	Educational institutions			Business and industry			Federal Government		
	1973	1975	1977	1973	1975	1977	1973	1975	1977
Total, all fields	129,400	149,200	163,100	53,400	64,600	71,500	18,200	19,000	21,400
Physical scientists	22,000	25,700	27,100	19,700	22,100	23,000	4,100	3,700	3,900
Mathematical scientists	10,500	11,700	12,200	900	1,100	1,300	500	600	600
Computer specialists	1,400	1,700	2,100	1,000	1,400	3,100	100	200	300
Environmental scientists	5,200	6,000	6,300	2,200	2,900	3,100	2,000	2,200	2,400
Engineers	13,000	14,900	15,900	17,800	22,100	22,900	2,700	3,000	3,500
Life scientists	39,200	43,800	47,500	7,200	8,800	10,100	6,100	6,300	6,800
Psychologists	15,100	17,700	18,600	3,100	4,100	5,500	1,200	1,000	1,200
Social scientists	23,000	27,700	33,400	1,600	2,100	2,600	1,500	2,000	2,600
	Percent distribution								
Total, all fields	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Physical scientists	17.0	17.2	16.6	36.8	34.2	18.5	22.5	19.7	18.5
Mathematical scientists	8.1	7.9	7.5	1.6	1.6	2.8	2.7	2.9	2.8
Computer specialists	1.1	1.1	1.3	1.9	2.2	1.2	.7	1.0	1.2
Environmental scientists	4.0	4.0	3.9	4.1	4.5	11.5	10.8	11.6	11.5
Engineers	10.1	10.0	9.8	33.3	34.2	16.5	15.0	15.9	16.5
Life scientists	30.3	29.4	29.1	13.6	13.7	31.7	33.6	33.1	31.7
Psychologists	11.7	11.9	11.4	5.8	6.4	5.8	6.8	5.1	5.8
Social scientists	17.8	18.6	20.5	3.0	3.2	12.4	8.0	10.6	12.4

NOTE: Detail may not add to totals because of rounding.
SOURCE: National Science Foundation

Table 73. Doctoral scientists and engineers by primary work activity and type of employer: 1973, 1975, and 1977

Primary work activity	Educational institutions			Business and industry			Federal Government		
	1973	1975	1977	1973	1975	1977	1973	1975	1977
Total	129,400	149,200	163,100	53,400	64,600	71,500	18,200	19,000	21,400
Research and development	30.700	35,600	42,600	23,800	28,700	31,300	10,000	10,400	10,800
Basic research	22,500	25,300	30,000	3,500	4,300	4,600	4,700	4,700	4,700
Applied research	7,600	9,600	11,100	13,200	15,100	16,500	4,800	5,000	5,200
Development	600	700	1,500	7,000	9,400	10,200	500	700	900
Management/administration	13,600	15,500	20,000	19,800	22,700	23,900	6,200	6,100	7,700
Of R&D	4,500	5,100	6,100	14,200	15,700	15,900	4,500	4,700	5,400
Other than R&D	6,200	6,800	10,100	3,500	4,700	6,100	1,000	900	1,500
Of both	2,900	3,500	3,800	2,100	2,200	1,900	700	500	700
Teaching	78,900	90,300	89,300	200	200	200	200	100	200
Other[1]	6,100	7,800	11,200	9,600	13,000	15,900	1,700	2,300	2,700
	Percent distribution								
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Research and development	23.7	23,9	26.1	44.5	44.5	43.9	55.0	54.6	50.8
Basic research	17.4	17.0	18.4	6.6	6.6	6.5	26.0	24.6	22.1
Applied research	5.9	6.4	6.8	24.7	23.4	23.1	26.4	26.6	24.4
Development	.5	.5	.9	13.1	14.5	14.2	2.6	3.5	4.3
Management/administration	10.5	10.4	12.3	37.2	35.1	33.5	34.0	32.3	35.9
Of R&D	3.5	3.4	3.8	26.7	24.3	22.3	24.7	24.8	25.3
Other than R&D	4.8	4.6	6.2	6.5	7.3	8.6	5.7	4.6	7.2
Of both	2.2	2.3	2.3	4.0	3.5	2.6	3.6	2.8	3.4
Teaching	61.0	60.6	54.7	.4	.3	.3	1.4	.7	.7
Other[1]	4.7	5.3	6.8	18.0	20.2	22.3	9.6	12.3	12.6

[1] Includes consulting, sales/professional services, other, and no report.
NOTE: Detail may not add to totals because of rounding.
SOURCE: National Science Foundation

Table 74. Selected characteristics of employed women doctoral scientists and engineers in the U.S.

Characteristics	1973				1975				1977			
	Number	Percent	Percent of total employed	Median annual salary	Number	Percent	Percent of total employed	Median annual salary	Number	Percent	Percent of total employed	Median annual salary
Total	16,958	100.0	7.7	$17,400	22,113	100.0	8.6	$19,000	27,502	100.0	9.7	$20,700
Field:												
Physical scientists	1,897	11.2	3.9	17,400	2,521	11.4	4.6	19,100	2,908	10.6	5.1	21,200
Chemists	1,461	8.6	4.8	17,300	2,046	9.3	5.7	19,000	2,354	8.6	6.3	20,900
Physicists/astronomers	436	2.6	2.5	17,700	475	2.1	2.5	19,300	554	2.0	2.8	23,100
Mathematical scientists	775	4.6	6.4	17,100	907	4.1	6.7	18,300	1,048	3.8	7.2	19,900
Mathematicians	701	4.1	6.6	16,800	822	3.7	6.9	18,100	934	3.4	7.3	19,900
Statisticians	74	.4	5.1	19,500	85	.4	4.9	22,100	114	.4	6.7	19,800
Computer specialists	88	.5	3.3	17,700	147	.7	4.2	18,000	233	.8	4.0	20,800
Environmental scientists	262	1.5	2.5	17,000	325	1.5	2.7	19,000	439	1.6	3.4	19,700
Earth scientists	205	1.2	2.4	16,700	242	1.1	2.5	18,200	293	1.1	3.0	20,000
Oceanographers	37	.2	3.2	(1)	51	.2	4.0	(1)	75	.3	4.8	19,200
Atmospheric scientists	20	.1	3.1	(1)	32	.1	2.4	(1)	71	.3	4.2	19,200
Engineers	139	.8	.4	19,600	235	1.1	.6	20,800	283	1.0	.6	22,900
Life scientists	6,120	36.1	10.5	17,300	7,534	34.1	11.6	18,900	8,983	32.7	12.5	21,000
Biological scientists	4,896	28.9	13.3	17,100	5,797	26.2	14.8	18,400	6,684	24.3	15.9	20,500
Agricultural scientists	131	.8	1.2	(1)	167	.8	1.3	20,000	264	1.0	1.8	20,200
Medical scientists	1,093	6.4	10.3	18,300	1,570	7.1	11.9	20,600	2,035	7.4	13.2	22,800
Psychologists	4,782	28.2	19.2	18,200	6,349	28.7	21.1	19,600	7,645	27.8	22.7	20,600
Social scientists	2,895	17.1	10.3	17,600	4,095	18.5	11.9	18,700	5,963	21.7	14.0	20,200
Economists	476	2.8	5.7	19,300	614	2.8	6.2	21,400	788	2.9	7.3	23,600
Sociologists/anthropologists	1,227	7.2	18.8	17,100	1,675	7.6	21.1	18,500	2,286	8.3	24.1	19,700
Other social scientists	1,192	7.0	9.0	17,400	1,806	8.2	10.8	18,200	2,889	10.5	12.9	19,800
Age:												
Under 30	1,026	6.1	10.6	14,400	1,534	6.9	16.1	15,900	1,640	6.0	19.4	17,400
30-34	3,546	20.9	7.1	14,900	4,970	22.5	9.0	16,800	6,621	24.1	12.4	18,400
35-39	2,767	16.3	6.6	16,600	4,082	18.5	7.6	18,300	5,641	20.5	8.5	20,000
40-44	2,445	14.4	6.9	17,900	2,810	12.7	7.0	19,900	3,479	12.6	7.7	21,700
45-49	2,488	14.7	8.3	18,700	2,917	13.2	8.7	21,300	3,291	12.0	8.7	23,100
50-54	1,845	10.9	7.7	19,500	2,407	10.9	8.4	22,300	2,887	10.5	9.3	24,700
55-59	1,379	8.1	8.9	20,200	1,467	6.6	8.0	21,600	1,876	6.8	8.3	24,200
60-64	847	5.0	9.4	20,500	1,160	5.2	10.3	22,700	1,233	4.5	9.5	25,000
65 & over	570	3.4	11.7	19,800	703	3.2	12.8	22,400	726	2.6	12.2	25,100
No report	45	.3	28.8	(1)	63	.3	24.0	(1)	108	.4	33.0	(1)
Sector of employment:												
Business & industry	1,363	8.0	2.6	19,700	2,141	9.7	3.3	22,200	2,959	10.8	4.1	24,400
Educational institutions	12,160	71.7	9.4	17,100	15,536	70.3	10.4	18,400	18,773	68.3	11.5	20,000
4-year coll./univ.	11,128	65.6	8.9	17,100	14,236	64.4	9.9	18,400	17,144	62.3	11.0	20,000
2-year college	549	3.2	18.5	17,000	701	3.2	19.7	18,700	927	3.4	20.0	19,700
Elem./sec. school	483	2.8	31.3	19,900	599	2.7	31.3	20,700	702	2.6	34.8	21,000
Hospital/clinic	967	5.7	21.3	17,500	1,745	7.9	23.4	19,400	1,958	7.1	22.8	21,000
Nonprofit organization	783	4.6	9.8	17,900	917	4.1	11.0	19,600	1,445	5.3	14.2	21,100
Federal Government	971	5.7	5.3	22,100	1,033	4.7	5.4	24,700	1,273	4.6	6.0	26,600
Military/Comm. Corps	19	.1	1.0	(1)	39	.2	1.8	(1)	47	.2	2.1	(1)
State government	386	2.3	12.9	19,000	393	1.8	13.0	19,700	495	1.8	13.1	19,500
Other government	188	1.1	15.0	17,300	235	1.1	12.5	19,900	345	1.3	22.3	21,700
Other	74	.4	22.4	16,700	15	.1	18.3	(1)	23	.1	3.9	(1)
No report	47	.3	16.4	18,500	59	.3	18.1	(1)	184	.7	13.6	(1)
Primary work activity:												
Research and development	4,654	27.4	6.5	17,400	5,998	27.1	7.3	19,100	7,594	27.6	8.1	21,000
Basic research	3,500	20.6	10.2	16,800	4,450	20.1	11.7	18,400	5,434	19.8	12.5	20,600
Applied research	1,004	5.9	3.5	19,100	1,323	6.0	4.0	20,400	1,755	6.4	4.8	22,200
Development	150	.9	1.8	17,200	225	1.0	2.0	19,500	405	1.5	3.0	20,500
Management or administration	1,837	10.8	4.0	22,300	2,441	11.0	4.7	22,900	3,438	12.5	5.7	25,100
Of R&D	704	4.2	2.7	23,200	893	4.0	3.1	24,300	1,234	4.5	4.0	26,300
Other than R&D	797	4.7	6.0	21,700	1,142	5.2	7.3	22,100	1,696	6.2	7.7	24,100
Of both	336	2.0	5.0	22,100	406	1.8	5.5	22,900	508	1.8	6.7	25,500
Teaching	7,504	44.3	9.4	17,000	9,480	42.9	10.4	18,200	10,396	37.8	11.5	19,500
Consulting	333	2.0	8.2	18,300	400	1.8	7.3	20,500	495	1.8	8.1	22,300
Sales/professional services	1,647	9.7	20.4	18,200	2,348	10.6	20.1	20,000	3,222	11.7	21.2	21,200
Other	641	3.8	9.2	(2)	822	3.7	11.0	(2)	1,652	6.0	12.9	(2)
No report	342	2.0	9.3	17,600	624	2.8	10.3	20,700	705	2.6	12.1	20,300

[1] No median computed for groups with fewer than 20 individuals reporting salary.

[2] Data not available.

NOTE: Percents may not add to 100 because of rounding. Median salaries computed for full-time employed civilians only.

SOURCE: National Science Foundation

Table 75. Doctoral scientists and engineers by field and race: 1977

Field	White	Black	Asian
Total, all fields ...	270,300	2,800	15,700
Physical scientists ..	55,300	600	3,400
Mathematical scientists	13,600	100	700
Computer specialists	5,000	15	600
Environmental scientists	12,500	24	500
Engineers	39,600	100	4,900
Life scientists	70,200	800	3,900
Psychologists	32,800	500	300
Social scientists	41,200	700	1,400

NOTE: Detail may not add to totals because of rounding.
SOURCE: National Science Foundation

Table 76. Doctoral scientists and engineers by type of employer, primary work activity, and race: 1977

Employer and work activity	White	Black	Asian
Type of employer			
Total	253,300	2,700	15,200
Business and industry	62,600	400	5,800
Educational institutions	146,100	1,800	7,300
Federal Government	19,400	300	800
Other[1]	25,300	200	1,300
Primary work activity			
Total	253,300	2,700	15,200
Research and development ...	108,400	1,000	9,500
Teaching	81,500	960	3,400
Other[2]	63,300	700	2,200

[1] Includes hospitals/clinics, nonprofit organizations, military, State and other government, other and no report.

[2] Includes consulting, sales/professional services, other, not employed, and no report.

NOTE: Detail may not add to totals because of rounding.
SOURCE: National Science Foundation

Table 77. Projected changes in doctoral scientists and engineers: 1977–87

(Percents)

Field	National Science Foundation	Bureau of Labor Statistics
Total	47.1	49.4
Physical scientists	35.7	27.5
Mathematical scientists ...	40.0	35.7
Engineers	63.6	33.8
Life scientists	45.1	55.5
Social scientists	52.7	79.0

SOURCE: National Science Foundation

Table 78. Projected full-time labor force of doctoral scientists and engineers: 1982 and 1987

[In thousands]

Derivation of 1982 and 1987 labor force	Total	Physical sciences	Engineering	Mathematical sciences	Life sciences	Social sciences
	1982					
Employed full time in 1977	277	69	44	20	70	73
Full-time entrants, 1977–82	110	19	19	7	29	35
Graduates[1]	114	20	20	7	30	37
Part time or not seeking employment	−4	−1	—	—	−1	−2
Net migration	−6	—	−2	—	−2	−2
Immigration	10	3	3	1	2	2
Emigration	−16	−3	−5	−1	−4	−4
Attrition	−29	−5	−3	−2	−9	−9
1982 full-time labor force	352	83	58	25	88	97
	1987					
Full-time entrants, 1983–87	102	18	20	6	28	30
Graduates[1]	106	19	21	6	29	32
Part time or not seeking employment	−4	−1	—	—	−1	−2
Net migration	−5	—	−2	—	−2	−2
Immigration	8	3	2	1	1	1
Emigration	−13	−3	−4	−1	−3	−3
Attrition	−36	−6	−4	−3	−11	−12
1987 full-time labor force	412	95	72	28	103	113

[1] Corrected for field-switching

NOTE: Detail may not add to totals because of rounding.
SOURCE: National Science Foundation

Table 79. Percent of science/engineering doctorates in non-science/engineering:[1] projections

Field	National Science Foundation	Bureau of Labor Statistics
Total	17	14
Physical scientists	9	10
Mathematical scientists	21	30
Engineers	19	−9[2]
Life scientists	16	20
Social scientists	19	27

[1] For NSF, data show estimated non-S/E utilization as percent of labor force for 1987. For BLS, data pertain to estimates of Ph.D.'s in traditional jobs as percent of total Ph.D. employment in 1985.

[2] That is, the supply of engineering Ph.D.'s is projected to fall short of requirements.

SOURCE: National Science Foundation

Table 80. Bachelor's and first-professional degrees awarded by field: 1960–78

Year	All fields	Science and engineering fields						All other fields[4]
		Total	Physical sciences[1]	Engineering	Mathematical sciences[2]	Life sciences	Social sciences[3]	
	Number							
1960	394,889	120,937	16,057	37,808	11,437	24,141	31,494	273,952
1961	401,784	121,660	15,500	35,866	13,127	23,900	33,267	280,124
1962	420,485	127,469	15,894	34,735	14,610	25,200	37,030	293,016
1963	450,592	135,964	16,276	33,458	16,128	27,801	42,308	314,628
1964	502,104	153,361	17,527	35,226	18,677	31,611	50,320	348,743
1965	538,930	164,936	17,916	36,795	19,668	34,842	55,715	373,994
1966	555,613	173,471	17,186	35,815	20,182	36,964	63,424	382,142
1967	594,862	187,849	17,794	36,188	21,530	39,408	72,929	407,013
1968	671,591	212,174	19,442	37,614	24,084	43,260	87,774	459,417
1969	769,683	244,519	21,591	41,553	28,263	48,713	104,399	525,164
1970	833,322	264,122	21,551	44,772	29,109	52,129	116,561	569,200
1971	884,386	271,176	21,549	45,387	27,306	51,461	125,473	613,210
1972	937,884	281,228	20,887	46,003	27,250	51,484	133,604	656,656
1973	980,707	295,391	20,809	46,989	27,528	59,486	140,579	685,316
1974	1,008,654	305,062	21,287	43,530	26,570	68,226	145,449	703,592
1975	987,922	294,920	20,896	40,065	23,385	72,710	137,864	693,002
1976	997,504	292,174	21,559	39,114	21,749	77,301	132,451	705,330
1977	993,008	288,543	22,618	41,581	20,729	78,472	125,143	704,465
1978	997,165	288,167	23,175	47,411	19,925	77,138	120,518	708,998
	As a percent of fields							
1960	100	31	4	10	3	6	8	69
1961	100	30	4	9	3	6	8	70
1962	100	30	4	8	4	6	9	70
1963	100	30	4	7	4	6	9	70
1964	100	31	4	7	4	6	10	69
1965	100	31	3	7	4	7	10	69
1966	100	31	3	6	4	7	11	69
1967	100	32	3	6	4	7	12	68
1968	100	32	3	6	4	6	13	68
1969	100	32	3	5	4	6	14	68
1970	100	32	3	5	4	6	14	68
1971	100	31	2	5	3	6	14	69
1972	100	30	2	5	3	6	14	70
1973	100	30	2	5	3	6	14	70
1974	100	30	2	4	3	7	14	70
1975	100	30	2	4	2	7	14	70
1976	100	29	2	4	2	8	13	71
1977	100	29	2	4	2	8	13	71
1978	100	29	2	5	2	8	12	71

[1] Including environmental sciences.

[2] Including statistics and computer specialities.

[3] Excluding history and including psychology.

[4] Including first-professional degrees such as M.D., D.D.S., D.V.M., and J.D. degrees.

NOTE: Percents may not add to 100 because of rounding.

SOURCE: National Center for Education Statistics and National Science Foundation, unpubished data.

Table 81. Master's degrees awarded by field: 1960–78

Year	All fields	Science and engineering fields						All other fields
		Total	Physical sciences[1]	Engineering	Mathematical sciences[2]	Life sciences	Social sciences[3]	
	Number							
1960	74,497	20,012	3,387	7,159	1,765	3,751	3,950	54,485
1961	78,269	22,786	3,799	8,178	2,238	4,085	4,486	55,483
1962	84,889	25,146	3,929	8,909	2,680	4,672	4,956	59,743
1963	91,418	27,367	4,132	9,635	3,323	4,718	5,559	64,051
1964	101,122	30,271	4,567	10,827	3,603	5,357	5,917	70,851
1965	112,195	33,835	4,918	12,056	4,294	5,978	6,589	78,360
1966	140,772	38,083	4,992	13,678	5,610	6,666	7,737	102,689
1967	157,892	41,800	5,412	13,885	5,733	7,465	9,305	116,092
1968	177,150	45,425	5,508	15,188	6,081	8,315	10,333	131,725
1969	194,414	48,425	5,911	15,243	6,735	8,809	11,727	145,989
1970	209,387	49,318	5,948	15,597	7,107	8,590	12,076	160,069
1971	231,486	50,624	6,386	16,347	6,789	8,320	12,782	180,862
1972	252,774	53,567	6,307	16,802	7,186	8,914	14,358	199,207
1973	264,525	54,234	6,274	16,758	7,146	9,080	14,976	210,291
1974	278,259	54,175	6,087	15,393	7,116	9,605	15,974	224,084
1975	293,651	53,852	5,830	15,434	6,837	9,618	16,333	239,799
1976	313,001	54,747	5,485	16,170	6,466	9,823	16,803	258,254
1977	318,241	56,731	5,345	16,889	6,496	10,707	17,294	261,510
1978	312,816	56,237	5,576	17,105	6,421	10,711	16,514	256,579
	As a percent of all fields							
1960	100	27	5	10	2	5	5	73
1961	100	29	5	10	3	5	6	71
1962	100	30	5	11	3	6	6	70
1963	100	30	5	11	4	5	6	70
1964	100	30	5	11	4	5	6	70
1965	100	30	4	11	4	5	6	70
1966	100	27	4	10	4	5	6	73
1967	100	26	3	9	4	5	6	74
1968	100	26	3	9	3	5	6	74
1969	100	25	3	8	4	5	6	75
1970	100	24	3	7	3	4	6	76
1971	100	22	3	7	3	4	6	78
1972	100	21	3	7	3	4	6	79
1973	100	21	2	6	3	3	6	79
1974	100	19	2	6	3	3	6	81
1975	100	18	2	5	2	3	6	82
1976	100	17	2	5	2	3	5	83
1977	100	18	2	5	2	3	5	82
1978	100	18	2	5	2	3	5	82

[1] Including environmental sciences.

[2] Including statistics and computer specialities.

[3] Excluding history and including psychology.

NOTE: Percents may not add to 100 because of rounding.

SOURCE: National Center for Education Statistics and National Science Foundation, unpublished data.

Table 82. Doctoral degrees awarded by field: 1965–78

Year	All fields	Science and engineering fields: Total	Physical sciences[1]	Engineering	Mathematical sciences[2]	Life sciences	Social sciences[3]	All other fields[4]
	Number							
1965	16,340	10,477	2,865	2,073	685	2,539	2,315	5,863
1966	17,953	11,456	3,058	2,299	769	2,712	2,618	6,497
1967	20,384	12,982	3,502	2,603	830	2,967	3,080	7,402
1968	22,916	14,411	3,667	2,847	970	3,501	3,426	8,505
1969	25,724	15,949	3,910	3,249	1,064	3,796	3,930	9,775
1970	29,475	17,731	4,400	3,432	1,222	4,163	4,514	11,744
1971	31,772	18,880	4,494	3,495	1,236	4,533	5,122	12,892
1972	33,001	18,940	4,226	3,475	1,281	4,505	5,453	14,061
1973	33,727	18,948	4,016	3,338	1,222	4,574	5,798	14,779
1974	33,000	18,316	3,696	3,144	1,196	4,407	5,873	14,684
1975	32,913	18,352	3,611	2,959	1,149	4,540	6,093	14,561
1976	32,923	17,832	3,442	2,791	1,003	4,480	6,116	15,091
1977	31,672	17,373	3,410	2,641	959	4,266	6,097	14,299
1978	30,850	17,034	3,234	2,423	959	4,361	6,057	13,816
	As a percent of all fields							
1965	100	64	18	13	4	16	14	36
1966	100	64	17	13	4	15	15	36
1967	100	64	17	13	4	15	15	36
1968	100	63	16	12	4	15	15	37
1969	100	62	15	13	4	15	15	38
1970	100	60	15	12	4	14	15	40
1971	100	59	14	11	4	14	16	41
1972	100	57	13	11	4	14	17	43
1973	100	56	12	10	4	14	17	44
1974	100	56	11	10	4	13	18	45
1975	100	56	11	9	3	14	19	44
1976	100	54	10	8	3	14	19	46
1977	100	55	11	8	3	13	19	45
1978	100	55	10	8	3	14	20	45

[1] Including environmental sciences.
[2] Including statistics and computer specialities.
[3] Including psychology.
[4] Excluding first-professional degrees such as M.D., D.D.S., D.V.M., and J.D.
SOURCE: National Academy of Sciences

Table 83. Employed 1976 science/engineering graduates by field and level of degree, and field of employment in 1978

Field of degree	FIELD OF EMPLOYMENT: Total employed	Chemistry	Physics/ astronomy	Other physical sciences	Mathematical sciences	Computer specialities	Environmental sciences	Engineering	Life sciences	Psychology	Social sciences	Non-science/ engineering
	BACHELOR'S DEGREE											
Total, all fields	264,600	5,700	1,400	700	2,500	14,100	4,300	47,000	23,900	8,200	11,200	145,600
Chemistry	7,500	**3,700**	—	70	—	200	100	800	800	30	—	1,900
Physics/astronomy	2,900	80	**1,100**	100	20	100	60	800	100	40	—	500
Other physical sciences	1,200	—	—	**30**	70	100	100	300	—	—	—	600
Mathematical sciences	13,800	—	200	80	**2,100**	5,100	200	1,200	40	40	40	5,000
Computer specialities	5,600	—	—	—	—	**4,800**	—	100	—	—	—	700
Environmental sciences	7,800	100	—	200	—	200	**2,700**	1,200	400	—	400	2,700
Engineering	45,400	50	50	100	70	1,000	100	**37,100**	300	—	70	6,500
Life sciences	59,800	1,500	80	100	40	900	600	2,900	**21,100**	200	300	32,000
Psychology	39,800	—	—	—	300	500	200	1,400	700	**7,100**	500	29,200
Social sciences	80,800	300	—	—	—	1,200	100	1,300	600	800	**9,900**	66,500
	MASTER'S DEGREE											
Total, all fields	54,600	1,200	1,100	300	1,400	3,900	1,700	14,400	5,200	3,900	4,400	17,200
Chemistry	2,200	**900**	60	60	—	40	20	200	100	—	—	700
Physics/astronomy	2,100	50	**800**	—	20	300	90	400	70	—	40	300
Other physical sciences	400	10	—	**10**	—	60	—	60	40	10	20	100
Mathematical sciences	4,800	30	60	100	**1,300**	900	60	300	30	60	100	1,800
Computer specialities	1,900	—	—	—	—	**1,200**	—	400	—	—	—	400
Environmental sciences	2,200	—	20	80	—	70	**1,100**	200	60	—	50	600
Engineering	16,800	30	100	80	70	1,200	60	**12,500**	70	—	100	2,600
Life sciences	8,100	20	—	—	50	40	90	70	**4,700**	—	60	2,900
Psychology	5,000	—	—	—	—	—	—	—	—	**3,700**	50	1,200
Social sciences	11,200	—	—	—	—	70	300	200	40	100	**4,000**	6,500

NOTE: Detail may not add to totals because of rounding.
SOURCE: National Science Foundation, unpublished data.

Table 84. Occupational mobility: 1972 scientists and engineers as employed in 1978

1972 occupation	1978 occupation										
	Total	Engineers	Computer specialists	Mathematical scientists	Physical scientists	Environmental scientists	Biological scientists	Psychologists	Social scientists	Administration/ management	Non-science/ engineering
		Percent									
Total, all fields	831,000	48.9	6.2	2.2	7.8	2.4	6.4	2.5	2.7	14.1	6.9
Engineers	510,000	**77.1**	1.1	.1	.7	.1	.2	.1	—	15.1	5.5
Computer specialists	67,000	7.2	**64.9**	1.1	.5	.5	.1	.2	.3	19.7	5.7
Mathematicians	28,000	7.8	6.8	**58.4**	1.3	.4	.5	.1	1.8	12.5	10.5
Physical scientists	80,000	5.2	1.2	.3	**70.8**	1.8	3.0	—	.1	11.3	6.4
Environmental scientists	21,000	3.3	.5	.2	3.7	**78.6**	3.1	.1	.3	6.8	3.4
Biological scientists	66,000	1.2	.1	.3	3.9	.9	**71.7**	.2	.7	9.0	12.0
Psychologists	24,000	.1	.1	.3	.1	—	.6	**79.6**	1.5	7.1	10.6
Social scientists	32,000	.5	.3	1.3	.1	.2	.7	1.9	**62.8**	15.3	17.0

SOURCE: National Science Foundation

Table 85. Supply of scientists and engineers: 1976, 1978, and 1980

Field	1976	1978	1980
Total	2,705,800	2,741,500	2,980,100
Physical scientists[1]	280,600	335,400	367,100
Mathematical scientists[2]	110,200	345,300	373,200
Engineers	1,375,200	1,396,400	1,491,900
Life scientists	314,100	327,600	375,200
Social scientists[3]	237,200	336,800	372,600

[1] Includes environmental scientists.

[2] Includes computer specialists.

[3] Includes psychologists.

SOURCE: National Science Foundation, unpublished data

other science resources publications

Science Resources Studies Highlights

S/E Personnel

	NSF Number	Price
"Hiring of Science and Engineering Faculty by 2- and 4-Year Colleges"	78-309	----
"Utilization of Science and Engineering Doctorates in Industrial Research and Development"	78-301	----

Reviews of Data on Science Resources

	NSF Number	Price
No. 35. "State and Local Government R&D Expenditures, FY 1977"	80-302	$1.25

S/E Personnel

	NSF Number	Price
No. 36. "Employment Characteristics of Recent Science and Engineering Graduates: The Effects of Work Experience, Advanced Degrees, and Business Cycles"	80-311	$1.50
No. 33. "U.S. Industrial R&D Spending Abroad"	79-304	$0.70
No. 31. "A Comparison of National Industrial R&D Estimates with Actual NSF/Census Data"	78-303	$0.80